

Water Quality Certification Application

New Hampshire Department of Transportation Walpole-Charlestown 14747

III. Additional Submittal Information

APPENDIX A:

Pollutant Loading Analysis Report

Towns of Walpole/Charlestown, NH
Federal No. X-A000(487), NHDOT No. 14747

N.H. Route 12 Reconstruction

POLLUTANT LOADING ANALYSIS REPORT

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New Hampshire Department of Transportation
Bureau of Highway Design

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POLLUTANT LOADING ANALYSIS REPORT

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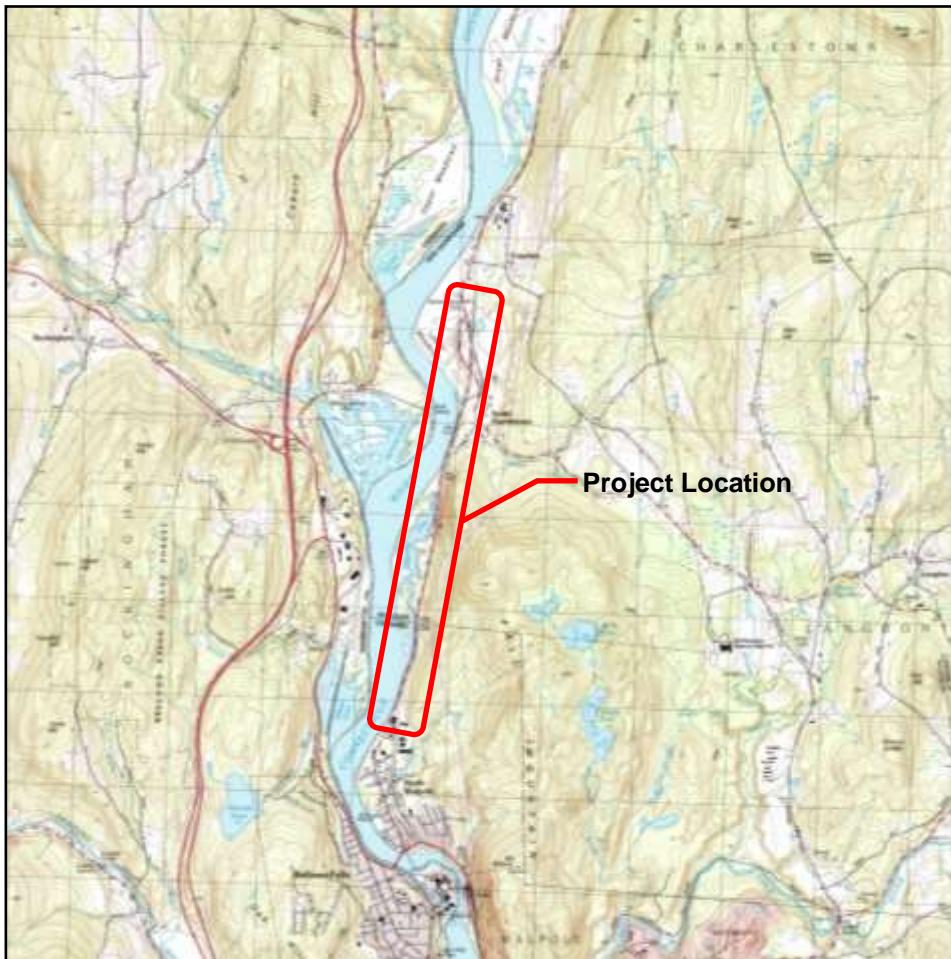
1. INTRODUCTION

This project involves the reconstruction and widening of approximately 2.7 miles of N.H. Route 12 from the Main Street intersection in North Walpole to the intersection of N.H. Route 12 and N.H. Route 12A in Charlestown.

The project includes the realignment and widening of N.H. Route 12 along the Connecticut River, full depth pavement construction, riverbank stabilization measures, new stormwater drainage systems, and roadside safety improvements. The project is designed to avoid all impacts to the New England Central Railroad along the east side of NH 12 and minimize impacts to the Connecticut River on the west side.

This report provides an assessment of the existing drainage facilities and provides supporting calculations and analyses for the proposed drainage facilities.

A locus plan of the project area is shown below:



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2. REFERENCES AND METHODOLOGY

References utilized for the pollutant loading analysis and design of the infiltration BMPs for this project include:

- *NH Stormwater Manual, December 2008*, published by NHDES.
- Extreme Precipitation Tables published by the Northeast Regional Climate Center (available online at www.nrcc.cornell.edu).
- USDA Natural Resources Conservation Service (NRCS) Web Soil Survey.

The area of study is the proposed roadway corridor for the length of the project. The width is the total width of the proposed roadway pavement (including the paved shoulders), plus 4 feet on each side of the proposed roadway to the outside edge of the infiltration BMP. For proper analysis, this is the same area used to determine the predevelopment areas. The roadway was divided into four separate segments for the pollutant loading analysis:

Segment 1: Sta. 2003+00 to Sta. 2046+50. Segment 1 is the southern end of the project and includes BMP # 1 and #2. The BMPs for this segment area located less than 75 feet from the Connecticut River.

Segment 2: Sta. 2046+50 to Sta. 2070+50. Segment 2 is the middle portion of the project along Meany's Cove and includes BMP #3. The BMP is located more than 75 feet from the Connecticut River.

Segment 3: Sta. 2070+50 to Sta. 2121+61. Segment 3 is most of the northern portion of the project and includes BMP #4 and a portion of BMP #5. The BMPs for this segment are located less than 75 feet from the Connecticut River.

Segment 4: Sta. 2121+61 to Sta. 2148+00. Segment 4 is the northernmost portion of the project and includes a section of BMP #5. The BMP is located more than 75 feet from the Connecticut River.

The infiltration BMPs were designed using the Infiltration Practice Design Criteria spreadsheet developed and provided by NHDES. The spreadsheet determines the water quality volume and drain times based on the impervious contributing area and design infiltration rate. Infiltration rates of subsurface soils were determined from NRCS soils data. A worksheet was completed for each low point located within each of the five infiltration BMPs.

A hydrologic analysis was performed for each infiltration BMP utilizing the HydroCAD Stormwater Modeling Software (Version 9.0), based on the TR-20 methodology. Both the 10 year and 50 year storm events were analyzed to determine the projected depth of each BMP subarea low point in the unanticipated event that infiltration no longer occurs. Precipitation data was obtained from the Extreme Precipitation Tables published by the Northeast Regional Climate Center. The Type III rainfall distribution curve was applied to each storm event.

The pollutant loading calculations were performed using the Simple Method load reduction model as recommended by NHDES. The Simple Method estimates pollutant loads for Total Suspended Solids (TSS), Total Nitrogen (TN), and Total Phosphorus (TP) as a product of the annual runoff volume and the pollutants load and concentration. This analysis requires the average annual

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precipitation, the event mean concentrations (EMC) for each pollutant, and the BMP removal efficiencies. The NHDES Simple Method Spreadsheet was used for this analysis.

Other parameters required for the pollutant loading calculations are discussed below.

Annual Average Precipitation: The average annual precipitation for Walpole NH is 44.86 inches. Refer to <https://www.ncdc.noaa.gov/cdo-web/datatools/normals>.

Event Mean Concentration (EMC): The EMC for each pollutant for the Urban Highway land use were obtained from Appendix D of the NH Stormwater Manual, and are as follows:

Source Area Unit	Total Suspended Solids (TSS) (mg/L)	Total Nitrogen (TN) (mg/L)	Total Phosphorus (TP) (mg/L)
Urban Highway	142	0.32	3.00

BMP Removal Efficiency: The BMP removal efficiencies for each pollutant for the infiltration trench were taken from Appendix E of the NH Stormwater Manual and are as follows:

	Total Removal Efficiency	Total Suspended Solids (TSS)	Total Nitrogen (TN)	Total Phosphorus (TP)
Infiltration Trench (>75 feet from surface water)	90%	90%	55%	60%
Infiltration Trench (<75 feet from surface water)	90%	90%	10%	60%

Appendix 5 includes a soils map and hydrologic soil data from the USDA NRCS Web Soil Survey.

Appendix 10 includes the proposed project General Plans submitted at the PSE design stage.

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3. EXISTING AND PROPOSED CONDITIONS

3.1 Existing Conditions

The overall drainage area for this project consists of approximately 5,459 acres and is comprised of 37 watersheds. Offsite drainage areas are identified as a significant source of stormwater runoff that discharge to the Connecticut River by means of drainage systems located below the railroad and roadway in the project area. Existing watershed plans can be found in Appendix 3 of this report.

The Connecticut River is located on the western side of Route 12 while the New England Central Railroad (NECR) is located on the eastern side of Route 12. Beyond the NECR lies hilly and mountainous terrain that slopes toward the project area and flows toward the river. In general, the railroad acts as a dividing point for stormwater from offsite areas and stormwater runoff from the roadway.

Currently, there are 23 existing outfalls on the project that discharge to the Connecticut River. Several of the drainage crossings located on the east side of the railroad convey stormwater directly to the Connecticut River; however, the majority of these crossings pass below the railroad and combine with roadway drainage before discharging to the river.

An existing drainage ditch between N.H. Route 12 and the railroad is located throughout the project where the roadway and railroad are in close proximity to each other. This ditch varies in size, but is particularly shallow and confined by the railroad predominately in the northern portion of the project near Route 12A. The ditch also contains drainage structures that collect runoff and discharge it to the Connecticut River.

Existing ground cover within the drainage areas generally consists of densely forested and meadow areas with farms and sparse residential development. Grassed areas with light tree growth are located around the light residential development along Route 12. Commercial development is primarily located at the beginning end of the project limits. Wetlands are found adjacent to the roadway and railroad and in numerous locations throughout the watersheds.

Maps of existing contributing areas within the watershed are included in Appendix 3.

3.2 Proposed Conditions

The proposed project will maintain many of the existing drainage pipe outlet locations and will not alter existing offsite areas to the east of the railroad track. Similar to the existing conditions, the railroad is a dividing point for stormwater through the project. Offsite flows originating east of the railroad track enter various culverts throughout the project area and do not reach the shared ditch. In calculating contributing areas for the shared ditch, the cross sections were reviewed to determine the crown of the track bed. If no crown was apparent, the center of the track bed was assumed to be the boundary.

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In general, there are four different types of drainage systems within the project limits:

- Existing culverts that flow from the east side of the railroad pass under the track and NH 12 and outlet on the west side of the roadway with no intermediate structures. The pipes will be extended to the proposed roadway embankment. Depending on condition and material, the pipe may be replaced underneath NH 12 only. The flows calculated from the existing conditions analyses do not change as a result of the proposed project.
- Existing culverts that flow from the east side of the railroad, pass through an intermediate structure in the shared ditch, and then flow under NH 12 to discharge west of the roadway. The pipes will be extended to the proposed roadway embankment. Depending on condition and material, the pipe may be replaced underneath NH 12 only.
- Proposed runoff from the paved roadway surface enters the infiltration BMP as it sheets off the pavement. The stormwater collects in the infiltration trench and percolates into the subsurface soils under NH 12. A PVC geomembrane prevents runoff in the shared ditch flow from entering the BMP and keeps roadway runoff within the infiltration stone.
- Proposed runoff from the northbound lane of NH 12 which sheet flows into the shared ditch, flows to an inlet, and then a small pipe network that discharges to the embankment on the west side of NH 12.

For sections of roadway with the infiltration BMP below the surface, stormwater runoff from both the northbound and southbound lanes sheet flows into the infiltration stone along the edges of the paved shoulders. The stormwater then percolates into the existing soils beneath the BMP. A series of dams within the floor of the BMP help retain the stormwater and promote infiltration. Overflow pipes with free flow discharges are located at low points in the profile to prevent the BMP from becoming fully saturated during heavy rainfall events.

For the sections of roadway where there is no infiltration BMP, the roadway will drain in similar manner to the existing conditions. Stormwater from the NH 12 southbound lane and shoulder sheet flows down the embankment to the Connecticut River or surrounding lowland. Stormwater from the NH 12 northbound lane and shoulder enters a roadside ditch between the roadway and railroad track. There are exceptions where the roadway is superelevated to one side or the other. From the ditch, stormwater reaches an inlet and is conveyed through a closed system to the west side of NH 12. There is no curbing along NH 12 within the project area.

Maps of proposed contributing areas along NH 12 are included in Appendix 4.

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4. INFILTRATION BMP DESIGN

The proposed BMP for this project is an infiltration trench located below NH 12. Situated below the proposed NH 12 pavement structure, the infiltration trench is 39 to 40 feet wide, depending on pavement width, and 18 inches deep. The infiltration trench consists of #4 stone enveloped in geotextile. The infiltration stone trench extends vertically to the surface for a width of three feet on the outside of the roadway shoulders to receive stormwater runoff from both sides of the roadway. The bottom of the infiltration trench shall be flat to promote infiltration.

The infiltration trench is proposed in the following areas:

- Area #1: From Sta. 2012+25 to Sta. 2022+56 (1,031 linear feet)
- Area #2: From Sta. 2025+03 to Sta. 2039+00 (1,397 linear feet)
- Area #3: From Sta. 2049+00 to Sta. 2062+00 (1,300 linear feet)
- Area #4: From Sta. 2073+50 to Sta. 2089+00 (1,550 linear feet)
- Area #5: From Sta. 2091+60 to Sta. 2130+00 (3,840 linear feet)

The infiltration trench generally follows the proposed profile of NH 12. To retain the stormwater in the trench and promote exfiltration into the sub-surface soils, impermeable dams at periodic intervals shall be constructed. The dams extend 6" vertically from the bottom of the trench into the infiltration stone and are constructed of PVC geomembrane. They will extend the full width of the trench. Dams shall be located such that the top of the downstream dam is at the same elevation as the bottom of the upstream dam.

To prevent groundwater and stormwater from non-pavement areas from entering the infiltration stone, the proposed 36" aggregate underdrain type 2 installed elsewhere on the project will be continued for the full length of the BMPs. A vertical PVC geomembrane shall be installed between the trench and underdrain to keep the water in each facility separate.

At low points in the infiltration BMPs, a transverse underdrain system with a corrugated pipe either 12" or 15" in diameter shall be installed. The transverse trench shall be 36" wide and a minimum of 2' deeper than the bottom of the infiltration BMP. The purpose of the transverse drainage is to provide relief to the infiltration trench only in the event it becomes inundated. A 6" high impermeable dam will be installed on each side of the transverse drainage trench. The transverse drainage shall either outlet to the slope on the west side of NH 12 or connect to a closed system. Corrugated pipes in transverse underdrains that only serve the BMP shall be 12" in diameter. For maintenance purposes, a flushing basin will be installed at the upstream end of the 12" transverse drainage pipe.

Several of the transverse drains also serve as a carrying pipe for stormwater flow from inlets in the shared ditch extending to an outlet on the west side of NH 12. The corrugated pipes in these combination transverse drains are 15" in diameter.

The infiltration BMPs are designed to infiltrate the Water Quality Volume (WQV) into the subsurface soils without any overflow entering the transverse drainage. The WQV is 1" of

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precipitation over the impervious contributing area, as calculated according to Chapter 2 of the NH Stormwater Manual Volume 2. BMP design volume calculations use 3" of depth over the area of the BMP, which represents the average height generated by the 6" tall dams on a slope. It is assumed that the infiltration stone will have a porosity of 30%. The table below shows the first-inch volumes and the design volume for each infiltration BMP. Each infiltration BMP is subdivided into smaller subareas based on the number of low points within the BMP.

Infiltration BMP	Low Point Station	Water Quality Volume (WQV) (cf)	BMP Design Volume (cf)
Area #1A	2013+18	2131	2475
Area #1B	2022+54.5	559	641
Area #2A	2025+05	978	1145
Area #2B	2033+31	2619	3054
Area #3A	2053+00	2900	3408
Area #3B	2061+98.5	385	442
Area #4A	2086+80	3846	4534
Area #5A	2091+61.5	1888	2230
Area #5B	2103+90	2447	2874
Area #5C	2114+40	3320	3879
Area #5D	2128+18	2098	2480

An "Infiltration Practice Design Criteria" worksheet, using the template provided by NHDES, was completed for each BMP subarea. Infiltration rates of subsurface soils were obtained from NRCS soils maps and properties. The infiltration rates determined and applied in the calculations were reviewed and confirmed by NHDOT. Bedrock elevations were obtained from cross sections; if not shown on cross sections, then the lowest elevation on the cross section grid was entered. SHWT elevations were obtained from nearby borings; if none were nearby, then the Connecticut River OHW elevation or bedrock elevation was entered.

A HydroCAD analysis was prepared to determine the projected depth of stormwater at each BMP subarea low point in the event that infiltration no longer occurs. Essentially replicating failure of the BMP, this scenario assumes that stormwater has filled the cells created by the dams, and runoff from a new storm event enters the BMP. The storage volumes for runoff were measured from the roadway profile and do not include areas impounded by the dams. The only way for stormwater to flow out of the BMP is to enter the perforated and corrugated plastic transverse drain pipe. It is assumed that the plastic pipe will have 3 holes in every corrugation valley. Information from a common plastic pipe manufacturer was obtained to determine the diameter of the perforations and frequency of corrugations per unit length of pipe. Both the 10 year and 50 year storm events were analyzed.

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The results from the HydroCAD analysis indicate that the water level remains below the top elevation of the BMP at all low points for the 10 year and 50 year storm events. Stormwater levels are not expected to reach and enter the crushed gravel roadway base material above the BMP. The table below shows the BMP elevations with the calculated peak water elevations. The heading "Freeboard" refers to the vertical separation between the peak water elevation and the top of the BMP.

Infiltration BMP	Bottom Elevation of BMP	Top Elevation of BMP	10 Year Storm		50 Year Storm	
			Peak Elevation	Freeboard (ft)	Peak Elevation	Freeboard (ft)
Area #1A	316.60	318.10	317.17	0.93	317.36	0.74
Area #1B	319.02	320.52	319.52	1.00	319.53	0.99
Area #2A	320.52	322.02	321.10	0.92	321.31	0.71
Area #2B	321.20	322.70	321.92	0.78	322.24	0.46
Area #3A	323.81	325.31	324.48	0.83	324.73	0.58
Area #3B	326.17	327.67	326.72	0.95	326.77	0.90
Area #4A	293.82	295.32	294.77	0.55	295.16	0.16
Area #5A	295.34	296.84	295.97	0.87	296.23	0.61
Area #5B	296.79	298.29	297.41	0.88	297.59	0.70
Area #5C	295.71	297.21	296.55	0.66	296.88	0.33
Area #5D	295.86	297.36	296.56	0.80	296.83	0.53

Included with this report are the following appendices supporting the Infiltration BMP design:

- Appendix 6: Infiltration Practice Design Criteria worksheets. A worksheet for each infiltration BMP subarea is included.
- Appendix 7: HydroCAD model and results for the infiltration failure scenario during the 10 year and 50 year storm events.
- Appendix 8: Miscellaneous infiltration BMP design calculations, including the surface area and treatment volumes, subsurface default infiltration rates obtained from NRCS soils data and maps, and number of perforations in 12" and 15" diameter corrugated, perforated plastic pipes.
- Appendix 9: Infiltration BMP Construction Details and Profiles.

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5. SUMMARY OF RESULTS

The roadway areas that are constructed with the infiltration trench system will significantly reduce the stormwater leaving the site and discharging into the Connecticut River since the purpose of the infiltration trench is to infiltrate the stormwater. These infiltrations systems disconnect the roadway areas from the directly contributing pollutant loads to the river. In addition, the pollutant removal efficiencies of the infiltration trenches further reduce the pollutant loading.

The results of the Simple Method load reduction model show that the infiltration trench BMP provides the necessary pollutant reduction for the proposed highway improvements. Appendix 1 presents the input data and results of the Simple Method load reduction model for the total project and each segment. It should be noted that the annual approximations of the pollutant loads are not storm event specific and the Simple Method assumes that the BMP's are appropriately sized to accommodate the design storm and that the BMP is properly installed and maintained.

The following table summarizes pre-development and post-development loads for all of the proposed infiltration BMPs on the project:

Total for project (All Infiltration BMPs)	Total Suspended Solids (TSS) (lbs/yr)	Total Phosphorus (TP) (lbs/year)	Total Nitrogen (TN) (lbs/yr)
Pre-Development Loads	10707.6	24.1	226.2
Post-Development Loads (no BMP)	5665.2	12.8	119.7
Post Development Loads (with BMP)	5180.5	12.5	112.9
Total Removal	5527.0	11.6	113.4
Total % Removal	51.6%	48.1%	50.1%

The following tables summarize pre-development and post-development loads for each segment.

Segment 1	Total Suspended Solids (TSS) (lbs/yr)	Total Phosphorus (TP) (lbs/year)	Total Nitrogen (TN) (lbs/yr)
Pre-Development Loads	3113.9	7.0	65.8
Post-Development Loads (no BMP)	1953.6	4.4	41.3
Post Development Loads (with BMP)	1823.1	4.4	39.4
Total Removal	1290.8	2.6	26.4
Total % Removal	41.5%	37.7%	40.1%

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Segment 2	Total Suspended Solids (TSS) (lbs/yr)	Total Phosphorus (TP) (lbs/year)	Total Nitrogen (TN) (lbs/yr)
Pre-Development Loads	1715.4	3.9	36.2
Post-Development Loads (no BMP)	1070.4	2.4	22.6
Post Development Loads (with BMP)	1001.7	2.3	21.6
Total Removal	713.6	1.5	14.6
Total % Removal	41.6%	40.0%	40.3%
Segment 3	Total Suspended Solids (TSS) (lbs/yr)	Total Phosphorus (TP) (lbs/year)	Total Nitrogen (TN) (lbs/yr)
Pre-Development Loads	3654.2	8.2	77.2
Post-Development Loads (no BMP)	803.0	1.8	17.0
Post Development Loads (with BMP)	561.8	1.7	13.6
Total Removal	3092.4	6.5	63.6
Total % Removal	84.6%	78.8%	82.4%
Segment 4	Total Suspended Solids (TSS) (lbs/yr)	Total Phosphorus (TP) (lbs/year)	Total Nitrogen (TN) (lbs/yr)
Pre-Development Loads	2224.1	5.0	47.0
Post-Development Loads (no BMP)	1838.2	4.1	38.8
Post Development Loads (with BMP)	1793.9	4.1	38.2
Total Removal	430.2	0.9	8.8
Total % Removal	19.3%	18.6%	18.7%

Appendix 2 contains Pollutant Loading Maps, which show the segments defined within the project area and the calculated predevelopment and postdevelopment pollutant loading.

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APPENDIX 1:

NHDES SIMPLE METHOD CALCULATION SPREADSHEETS

NHDOT Walpole-Charlestown 14747

Condition	Point of Analysis (PoA) Number	Sub-Area Number	Area Description	Land Use	BMP	Is the Impervious Area Disconnected in accordance with Chapter 6, Volume 1 of the NH Stormwater Manual or is the BMP an Infiltration BMP designed in accordance with Alteration of Terrain regulations (Env-Wq 1500)?	Pervious Undisturbed (i.e. forest, meadow, etc.)	Pervious Disturbed (i.e. lawn or other area that will be fertilized regularly)	Pervious Pavement that filters and infiltrates all stormwater (no underdrains)	Pervious Disturbed Other	Description of Pervious Disturbed Other	Pervious Total	Pervious Pavement that filters but does not infiltrate all stormwater (has underdrains)	Impervious Roof	Impervious Road	Impervious Parking and Drives	Impervious Sidewalks	Impervious Surface Water	Impervious Other	Description of Impervious Other	Impervious Total (prior to Disconnection or Infiltration BMP Credit)	Total Area	Composite % Impervious (without disconnection or infiltration credit)	Composite % Impervious (with disconnection or infiltration credit)	
Pre-Development	1	1-N	Connecticut River S. (No Treat)	Urban Highway	none	NO	0.00	0.00	0.00	1.57	shoulder panel	1.57	0.00	0.00	2.45	0.00	0.00	0.00	0.00	0.00	0.00	2.45	4.02	60.87%	60.87%
Pre-Development	1	1-T	Connecticut River S. (Treatment)	Urban Highway	none	NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Pre-Development	2	2-N	Meany's Cove (No Treat)	Urban Highway	none	NO	0.00	0.00	0.00	0.83	shoulder panel	0.83	0.00	0.00	1.35	0.00	0.00	0.00	0.00	0.00	0.00	1.35	2.18	61.98%	61.98%
Pre-Development	2	2-T	Meany's Cove (Treatment)	Urban Highway	none	NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Pre-Development	3	3-N	Connecticut River N. (No Treat)	Urban Highway	none	NO	0.00	0.00	0.00	1.78	shoulder panel	1.78	0.00	0.00	2.88	0.00	0.00	0.00	0.00	0.00	0.00	2.88	4.66	61.75%	61.75%
Pre-Development	3	3-T	Connecticut River N. (Treatment)	Urban Highway	none	NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Pre-Development	4	4-N	Connecticut River N. of Crossing 9 (No Treatment)	Urban Highway	none	NO	0.00	0.00	0.00	0.76	shoulder panel	0.76	0.00	0.00	1.77	0.00	0.00	0.00	0.00	0.00	0.00	1.77	2.53	69.98%	69.98%
Pre-Development	4	4-T	Connecticut River N. of Crossing 9 (Treatment)	Urban Highway	none	NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		

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Condition	Point of Analysis (PoA) Number	Sub-Area Number	Area Description	Land Use	BMP	Is the Impervious Area Disconnected in accordance with Chapter 6, Volume 1 of the NH Stormwater Manual or is the BMP an Infiltration BMP designed in accordance with Alteration of Terrain regulations (Env-Wq 1500)?	Pervious Undisturbed (i.e. forest, meadow, etc.)	Pervious Disturbed (i.e. lawn or other area that will be fertilized annually)	Pervious Pavement that filters and infiltrates all stormwater (no underdrains)	Pervious Disturbed Other	Description of Pervious Disturbed Other	Pervious Total	Pervious Pavement that filters but does not infiltrate all stormwater (has underdrains)	Impervious Roof	Impervious Road	Impervious Parking and Drives	Impervious Sidewalks	Impervious Surface Water	Impervious Other	Description of Impervious Other	Impervious Total (Prior to Disconnection or Infiltration BMP Credit)	Total Area	Composite % Impervious (without disconnection or infiltration credit)	Composite % Impervious (with disconnection or infiltration credit)	Percent that is Pervious Disturbed (i.e. lawn or other area that will be fertilized annually)	
																							%			
Post-Development	1	1-N	Connecticut River S. (No Treat)	Urban Highway		NO	0.00	0.00	0.00	0.33	shoulder panel	0.33	0.00	0.00	1.45	0.00	0.00	0.00	0.00	0.00	0.00	1.45	1.78	81.53%	81.53%	0.0%
Post-Development		1-T	Connecticut River S. (Treatment)	Urban Highway	Infiltration Trench	YES	0.00	0.00	2.24	0.00	stone	2.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.24	0.00%	0.00%	0.0%
Post-Development	2	2-N	Meany's Cove (No Treat)	Urban Highway		NO	0.00	0.00	0.00	0.20	shoulder panel	0.20	0.00	0.00	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.80	1.00	79.78%	79.78%	0.0%
Post-Development		2-T	Meany's Cove (Treatment)	Urban Highway	Infiltration Trench	YES	0.00	0.00	1.18	0.00	stone	1.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.18	0.00%	0.00%	0.0%
Post-Development	3	3-N	Connecticut River N. (No Treat)	Urban Highway		NO	0.00	0.00	0.00	0.09	shoulder panel	0.09	0.00	0.00	0.43	0.00	0.00	0.00	0.00	0.00	0.00	0.43	0.52	83.01%	83.01%	0.0%
Post-Development		3-T	Connecticut River N. (Treatment)	Urban Highway	Infiltration Trench	YES	0.00	0.00	4.14	0.00	stone	4.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.14	0.00%	0.00%	0.0%
Post-Development	4	4-N	Connecticut River N of Crossing 9 (No Treatment)	Urban Highway		NO	0.00	0.00	0.00	0.33	shoulder panel	0.33	0.00	0.00	1.44	0.00	0.00	0.00	0.00	0.00	0.00	1.44	1.77	81.27%	81.27%	0.0%
Post-Development		4-T	Connecticut River N of Crossing 9 (Treatment)	Urban Highway	Infiltration Trench	YES	0.00	0.00	0.76	0.00	stone	0.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.76	0.00%	0.00%	0.0%

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2015-04-15

Tab 3 of 9

Date (MM/DD/YYYY):

Project Name:

Town/City:

Impacted Surface Waters:

Applicant:

DES File #:

4/29/2017	
Walpole-Charlestown 14747 Reconstruct NH 12	
Walpole and Charlestown NH	
Connecticut River	
New Hampshire Department of Transportation	

Average Annual Precipitation P
Fraction of Annual Runoff events that produce runoff

44.86	inches
0.90	(usually 0.9)

ONLY INPUT VALUES IN BLUE SHADDED CELLS

Credit for Using Low Nutrient Fertilizer: If there are managed turf areas under post development conditions that are to be fertilized annually, reductions in post development nutrient (TP and TN) loadings can be realized by providing enforceable documents (i.e., deed restrictions) requiring land owners to use low nutrient fertilizer. To get low nutrient fertilizer pollutant reductions input the proposed reduced fertilizer application rates for post development development for TP and TN in the table below. Low nutrient fertilizers must have application rates less than the standard fertilizer application rate shown in the table. Then input the percent of each land use in each post development sub-area that is managed turf that is fertilized annually.

Fertilizer Reduction Calculator	
TP	TN
15.0	150.0
15.0	150.0
0.0%	0.0%
50%	50%
10%	10%
0.0%	0.0%
0.11	1.74

Used to reduce EMCs for Post TP and Post TN
for each land use in each Sub Area depending on percent
of area that is managed turf that is fertilized annually

STANDARD FERTILIZER APPLICATION RATE (lbs/acre/year)
PROPOSED REDUCED FERTILIZER APPLICATION RATES FOR POST-DEVELOPMENT (lbs/acre/year)
INTENDED FERTILIZER REDUCTION
PERCENT OF CULTIVATED TURF WILL COMPLY WITH REDUCED APPLICATION RATES
PERCENT OF APPLIED FERTILIZER THAT IS LOST TO RUNOFF OR PERCOLATION
FINAL PERCENT FERTILIZER REDUCTION WITH COMPLIANCE AND RUNOFF RATES APPLIED (%FR)
MINIMUM ASSUMED EMC = EMC_{MIN} (mg/L)

PRE-DEVELOPMENT CONDITIONS			POST-DEVELOPMENT CONDITIONS		
Area	Impervious Area		Area	Impervious Area	Area Fertilized Annually
Total Area (All Sub-Areas) (acres)	13.38	8.44		13.38	4.12
Insert information for 1st sub-area below					
Sub_Area_ID	1-N PRE		Sub_Area_ID	1-N POST	
Point of Analysis (PoA) Number	1		Point of Analysis (PoA) Number	1	
Total Area for Sub-Area (acres)	4.02	2.45	Total Area in Sub-Area (acres)	1.78	1.45
Insert information for 2nd sub-area below					
Sub_Area_ID	1-T PRE		Sub_Area_ID	1-T POST	
Point of Analysis (PoA) Number	1		Point of Analysis (PoA) Number	1	
Total Area for Sub-Area (acres)	0.00	0.00	Total Area in Sub-Area (acres)	2.24	0.00
Land Use	Area (acres)	Ia (% Impervious)	Land Use	Total Area for each Land Use (acres)	Ia (% Impervious) Percent of Area that is managed turf (i.e., fertilized annually) Post-TP EMC mg/L Post-TN EMC mg/L
From HWG			From HWG		
Residential Roof	0.00	0.00%	Residential Roof	0.00	0.00% 0.11 1.50
Commercial Roof	0.00	0.00%	Commercial Roof	0.00	0.00% 0.14 2.10
Commercial/Res Parking	0.00	0.00%	Commercial/Res Parking	0.00	0.00% 0.15 1.00
Residential Street	0.00	0.00%	Residential Street	0.00	0.00% 0.55 1.40
Urban Highway	4.02	60.87%	Urban Highway	1.78	81.53% 0.32 3.00
Laws	0.00	0.00%	Laws	0.00	0.00% 2.10 9.10
Driveway	0.00	0.00%	Driveway	0.00	0.00% 0.56 2.10
Residential (general)	0.00	0.00%	Residential (general)	0.00	0.00% 0.40 2.20
Commercial (general)	0.00	0.00%	Commercial (general)	0.00	0.00% 0.20 2.00
Industrial (general)	0.00	0.00%	Industrial (general)	0.00	0.00% 0.40 2.50
From CDM			From CDM		
Agriculture and Pasture	0.00	0.00%	Agriculture and Pasture	0.00	0.00% 0.37 5.98
Commercial	0.00	0.00%	Commercial	0.00	0.00% 0.33 2.97
Forest/Rural Open	0.00	0.00%	Forest/Rural Open	0.00	0.00% 0.11 1.74
Highway	0.00	0.00%	Highway	0.00	0.00% 0.43 2.65
Industrial	0.00	0.00%	Industrial	0.00	0.00% 0.32 3.97
Medium Density Residential	0.00	0.00%	Medium Density Residential	0.00	0.00% 0.52 5.15
Urban Open	0.00	0.00%	Urban Open	0.00	0.00% 0.11 1.74
Water/Wetland	0.00	0.00%	Water/Wetland	0.00	0.00% 0.08 1.38
Sub_Area_ID	1-T PRE		Sub_Area_ID	1-T POST	
Point of Analysis (PoA) Number	1		Point of Analysis (PoA) Number	1	
Total Area for Sub-Area (acres)	0.00	0.00	Total Area in Sub-Area (acres)	2.24	0.00
Land Use	Area (acres)	Ia (% Impervious)	Land Use	Area (acres)	Ia (% Impervious) Percent of Area that is managed turf (i.e., fertilized annually) Post-TP EMC mg/L Post-TN EMC mg/L
From HWG			From HWG		
Residential Roof	0.00	0.00%	Residential Roof	0.00	0.00% 0.11 1.50
Commercial Roof	0.00	0.00%	Commercial Roof	0.00	0.00% 0.14 2.10
Commercial/Res Parking	0.00	0.00%	Commercial/Res Parking	0.00	0.00% 0.15 1.00
Residential Street	0.00	0.00%	Residential Street	0.00	0.00% 0.55 1.40
Urban Highway	0.00	0.00%	Urban Highway	2.24	0.00% 0.32 3.00
Laws	0.00	0.00%	Laws	0.00	0.00% 2.10 9.10
Driveway	0.00	0.00%	Driveway	0.00	0.00% 0.56 2.10
Residential (general)	0.00	0.00%	Residential (general)	0.00	0.00% 0.40 2.20
Commercial (general)	0.00	0.00%	Commercial (general)	0.00	0.00% 0.20 2.00
Industrial (general)	0.00	0.00%	Industrial (general)	0.00	0.00% 0.40 2.50
From CDM			From CDM		
Agriculture and Pasture	0.00	0.00%	Agriculture and Pasture	0.00	0.00% 0.37 5.98
Commercial	0.00	0.00%	Commercial	0.00	0.00% 0.33 2.97
Forest/Rural Open	0.00	0.00%	Forest/Rural Open	0.00	0.00% 0.11 1.74
Highway	0.00	0.00%	Highway	0.00	0.00% 0.43 2.65
Industrial	0.00	0.00%	Industrial	0.00	0.00% 0.32 3.97
Medium Density Residential	0.00	0.00%	Medium Density Residential	0.00	0.00% 0.52 5.15
Urban Open	0.00	0.00%	Urban Open	0.00	0.00% 0.11 1.74
Water/Wetland	0.00	0.00%	Water/Wetland	0.00	0.00% 0.08 1.38

Insert information for 3rd sub-area below			
Sub_Area_ID	2-N PRE	Sub_Area_ID	2-N POST
Point of Analysis (PoA) Number	2	Point of Analysis (PoA) Number	2
Total Area for Sub-Area (acres)	2.18	Total Area in Sub-Area (acres)	1.00
			Percent of Area that is managed turf (i.e., fertilized annually)
			Post-TP EMC
			Post-TN EMC
Land Use	Area (acres)	Ia (% Impervious)	mg/L
From HWG			
Residential Roof	0.00	0.00%	0.11
Commercial Roof	0.00	0.00%	2.10
Commercial/Res Parking	0.00	0.00%	0.15
Residential Street	0.00	0.00%	0.55
Urban Highway	2.18	61.98%	1.40
Lawns	0.00	0.00%	0.32
Driveway	0.00	0.00%	3.00
Residential (general)	0.00	0.00%	2.10
Commercial (general)	0.00	0.00%	0.56
Industrial (general)	0.00	0.00%	2.20
From CDM			
Agriculture and Pasture	0.00	0.00%	0.40
Commercial	0.00	0.00%	0.20
Forest/Rural Open	0.00	0.00%	0.40
Highway	0.00	0.00%	0.20
Industrial	0.00	0.00%	0.40
Medium Density Residential	0.00	0.00%	0.52
Urban Open	0.00	0.00%	0.11
Water/Wetland	0.00	0.00%	0.08

Insert information for 4th sub-area below			
Sub_Area_ID	2-T PRE	Sub_Area_ID	2-T POST
Point of Analysis (PoA) Number	2	Point of Analysis (PoA) Number	2
Total Area for Sub-Area (acres)	0.00	Total Area in Sub-Area (acres)	1.18
			Percent of Area that is managed turf (i.e., fertilized annually)
			Post-TP EMC
			Post-TN EMC
Land Use	Area (acres)	Ia (% Impervious)	mg/L
From HWG			
Residential Roof	0.00	0.00%	0.11
Commercial Roof	0.00	0.00%	2.10
Commercial/Res Parking	0.00	0.00%	0.15
Residential Street	0.00	0.00%	0.55
Urban Highway	0.00	0.00%	1.40
Lawns	0.00	0.00%	0.32
Driveway	0.00	0.00%	3.00
Residential (general)	0.00	0.00%	2.10
Commercial (general)	0.00	0.00%	0.56
Industrial (general)	0.00	0.00%	2.20
From CDM			
Agriculture and Pasture	0.00	0.00%	0.40
Commercial	0.00	0.00%	0.20
Forest/Rural Open	0.00	0.00%	0.40
Highway	0.00	0.00%	0.20
Industrial	0.00	0.00%	0.40
Medium Density Residential	0.00	0.00%	0.52
Urban Open	0.00	0.00%	0.11
Water/Wetland	0.00	0.00%	0.08

Insert information for 5th sub-area below			
Sub_Area_ID	3-N PRE	Sub_Area_ID	3-N POST
Point of Analysis (PoA) Number	3	Point of Analysis (PoA) Number	3
Total Area for Sub-Area (acres)	4.66	Total Area in Sub-Area (acres)	0.52
			Percent of Area that is managed turf (i.e., fertilized annually)
			Post-TP EMC
			Post-TN EMC
Land Use	Area (acres)	Ia (% Impervious)	mg/L
From HWG			
Residential Roof	0.00	0.00%	0.11
Commercial Roof	0.00	0.00%	2.10
Commercial/Res Parking	0.00	0.00%	0.15
Residential Street	0.00	0.00%	0.55
Urban Highway	4.66	61.75%	1.40
Lawns	0.00	0.00%	0.32
Driveway	0.00	0.00%	3.00
Residential (general)	0.00	0.00%	2.10
Commercial (general)	0.00	0.00%	0.56
Industrial (general)	0.00	0.00%	2.20
From CDM			
Agriculture and Pasture	0.00	0.00%	0.40
Commercial	0.00	0.00%	0.20
Forest/Rural Open	0.00	0.00%	0.40
Highway	0.00	0.00%	0.20
Industrial	0.00	0.00%	0.40
Medium Density Residential	0.00	0.00%	0.52
Urban Open	0.00	0.00%	0.11
Water/Wetland	0.00	0.00%	0.08

Insert information for 6th sub-area below		
Sub_Area_ID	3-T PRE	Sub_Area_ID
Point of Analysis (PoA) Number	3	Point of Analysis (PoA) Number
Total Area for Sub-Area (acres)	0.00	Total Area in Sub-Area (acres)

						Percent of Area that is managed turf (i.e., fertilized annually)	Post-TP EMC	Post-TN EMC
Land Use	Area (acres)	Ia (% Impervious)	Land Use	Area (acres)	Ia (% Impervious)	%	mg/L	mg/L
From HWG								
Residential Roof	0.00	0.00%	Residential Roof	0.00	0.00%	0.0%	0.11	1.50
Commercial Roof	0.00	0.00%	Commercial Roof	0.00	0.00%	0.0%	0.14	2.10
Commercial/Res Parking	0.00	0.00%	Commercial/Res Parking	0.00	0.00%	0.0%	0.15	1.90
Residential Street	0.00	0.00%	Residential Street	0.00	0.00%	0.0%	0.55	1.40
Urban Highway	0.00	0.00%	Urban Highway	4.14	0.00%	0.0%	0.32	3.00
Lawns	0.00	0.00%	Lawns	0.00	0.00%	0.0%	0.56	9.10
Driveway	0.00	0.00%	Driveway	0.00	0.00%	0.0%	0.40	2.20
Residential (general)	0.00	0.00%	Residential (general)	0.00	0.00%	0.0%	0.20	2.00
Commercial (general)	0.00	0.00%	Commercial (general)	0.00	0.00%	0.0%	0.40	2.50
Industrial (general)	0.00	0.00%	Industrial (general)	0.00	0.00%	0.0%	0.40	2.50
From CDM								
Agriculture and Pasture	0.00	0.00%	Agriculture and Pasture	0.00	0.00%	0.0%	0.37	5.98
Commercial	0.00	0.00%	Commercial	0.00	0.00%	0.0%	0.33	2.97
Forest/Rural Open	0.00	0.00%	Forest/Rural Open	0.00	0.00%	0.0%	0.11	1.74
Highway	0.00	0.00%	Highway	0.00	0.00%	0.0%	0.43	2.65
Industrial	0.00	0.00%	Industrial	0.00	0.00%	0.0%	0.32	3.97
Medium Density Residential	0.00	0.00%	Medium Density Residential	0.00	0.00%	0.0%	0.52	5.15
Urban Open	0.00	0.00%	Urban Open	0.00	0.00%	0.0%	0.11	1.74
Water/Wetland	0.00	0.00%	Water/Wetland	0.00	0.00%	0.0%	0.08	1.38

Insert information for 7th sub-area below		
Sub_Area_ID	4-N PRE	Sub_Area_ID
Point of Analysis (PoA) Number	4	Point of Analysis (PoA) Number
Total Area for Sub-Area (acres)	2.53	Total Area in Sub-Area (acres)

						Percent of Area that is managed turf (i.e., fertilized annually)	Post-TP EMC	Post-TN EMC
Land Use	Area (acres)	Ia (% Impervious)	Land Use	Area (acres)	Ia (% Impervious)	%	mg/L	mg/L
From HWG								
Residential Roof	0.00	0.00%	Residential Roof	0.00	0.00%	0.0%	0.11	1.50
Commercial Roof	0.00	0.00%	Commercial Roof	0.00	0.00%	0.0%	0.14	2.10
Commercial/Res Parking	0.00	0.00%	Commercial/Res Parking	0.00	0.00%	0.0%	0.15	1.90
Residential Street	0.00	0.00%	Residential Street	0.00	0.00%	0.0%	0.55	1.40
Urban Highway	2.53	69.98%	Urban Highway	1.77	81.27%	0.0%	0.32	3.00
Lawns	0.00	0.00%	Lawns	0.00	0.00%	0.0%	0.56	9.10
Driveway	0.00	0.00%	Driveway	0.00	0.00%	0.0%	0.40	2.10
Residential (general)	0.00	0.00%	Residential (general)	0.00	0.00%	0.0%	0.20	2.20
Commercial (general)	0.00	0.00%	Commercial (general)	0.00	0.00%	0.0%	0.40	2.00
Industrial (general)	0.00	0.00%	Industrial (general)	0.00	0.00%	0.0%	0.40	2.50
From CDM								
Agriculture and Pasture	0.00	0.00%	Agriculture and Pasture	0.00	0.00%	0.0%	0.37	5.98
Commercial	0.00	0.00%	Commercial	0.00	0.00%	0.0%	0.33	2.97
Forest/Rural Open	0.00	0.00%	Forest/Rural Open	0.00	0.00%	0.0%	0.11	1.74
Highway	0.00	0.00%	Highway	0.00	0.00%	0.0%	0.43	2.65
Industrial	0.00	0.00%	Industrial	0.00	0.00%	0.0%	0.32	3.97
Medium Density Residential	0.00	0.00%	Medium Density Residential	0.00	0.00%	0.0%	0.52	5.15
Urban Open	0.00	0.00%	Urban Open	0.00	0.00%	0.0%	0.11	1.74
Water/Wetland	0.00	0.00%	Water/Wetland	0.00	0.00%	0.0%	0.08	1.38

Insert information for 8th sub-area below		
Sub_Area_ID	4-T PRE	Sub_Area_ID
Point of Analysis (PoA) Number	4	Point of Analysis (PoA) Number
Total Area for Sub-Area (acres)	0.00	Total Area in Sub-Area (acres)

						Percent of Area that is managed turf (i.e., fertilized annually)	Post-TP EMC	Post-TN EMC
Land Use	Area (acres)	Ia (% Impervious)	Land Use	Area (acres)	Ia (% Impervious)	%	mg/L	mg/L
From HWG								
Residential Roof	0.00	0.00%	Residential Roof	0.00	0.00%	0.0%	0.11	1.50
Commercial Roof	0.00	0.00%	Commercial Roof	0.00	0.00%	0.0%	0.14	2.10
Commercial/Res Parking	0.00	0.00%	Commercial/Res Parking	0.00	0.00%	0.0%	0.15	1.90
Residential Street	0.00	0.00%	Residential Street	0.00	0.00%	0.0%	0.55	1.40
Urban Highway	0.00	0.00%	Urban Highway	0.76	0.00%	0.0%	0.32	3.00
Lawns	0.00	0.00%	Lawns	0.00	0.00%	0.0%	2.10	9.10
Driveway	0.00	0.00%	Driveway	0.00	0.00%	0.0%	0.56	2.10
Residential (general)	0.00	0.00%	Residential (general)	0.00	0.00%	0.0%	0.40	2.20
Commercial (general)	0.00	0.00%	Commercial (general)	0.00	0.00%	0.0%	0.20	2.00
Industrial (general)	0.00	0.00%	Industrial (general)	0.00	0.00%	0.0%	0.40	2.50
From CDM								
Agriculture and Pasture	0.00	0.00%	Agriculture and Pasture	0.00	0.00%	0.0%	0.37	5.98
Commercial	0.00	0.00%	Commercial	0.00	0.00%	0.0%	0.33	2.97
Forest/Rural Open	0.00	0.00%	Forest/Rural Open	0.00	0.00%	0.0%	0.11	1.74
Highway	0.00	0.00%	Highway	0.00	0.00%	0.0%	0.43	2.65
Industrial	0.00	0.00%	Industrial	0.00	0.00%	0.0%	0.32	3.97
Medium Density Residential	0.00	0.00%	Medium Density Residential	0.00	0.00%	0.0%	0.52	5.15
Urban Open	0.00	0.00%	Urban Open	0.00	0.00%	0.0%	0.11	1.74
Water/Wetland	0.00	0.00%	Water/Wetland	0.00	0.00%	0.0%	0.08	1.38

Date (MM/DD/YYYY): 4/29/2017
Project Name: Walpole-Charlestown 14747 Reconstruct NH 12
Town/City: Walpole and Charlestown NH
Impacted Surface Waters: Connecticut River
Applicant: New Hampshire Department of Transportation
DES File #:

ONLY CHANGE VALUES SHADED IN BLUE

Pollutant Loading Spreadsheet Model simple_method TOTAL SUMMARY
OVERALL SUMMARY

6/22/2017

Date (MM/DD/YYYY): **4/29/2017**
 Project Name: **Walpole-Charlestown 14747 Reconstruct NH 12**
 Town/City: **Walpole and Charlestown NH**
 Impacted Surface Waters: **Connecticut River**
 Applicant: **New Hampshire Department of Transportation**
 DES File #:

TOTAL PRE -DEVELOPMENT (PRE-DEV) AREA (ACRES) =	13.38
TOTAL PRE-DEV EFFECTIVE IMPERVIOUS AREA (ACRES) =	8.44
TOTAL PRE-DEV PERCENT EFFECTIVE IMPERVIOUS (%) =	63.1%
TOTAL POST DEVELOPMENT (POST-DEV) AREA (ACRES) =	13.38
TOTAL POST-DEV EFFECTIVE IMPERVIOUS AREA (ACRES) =	4.12
TOTAL POST-DEV PERCENT EFFECTIVE IMPERVIOUS (%) =	30.8%
TOTAL POST-DEV AREA THAT IS FERTILIZED ANNUALLY (ACRES) =	0.00
TOTAL POST-DEV PERCENT OF AREA THAT IS FERTILIZED ANNUALLY (%) =	0.0%

	TSS (LBS/YR)	TP (LBS/YR)	TN (LBS/YR)
PRE DEVELOPMENT LOADS (NO BMPS)	10707.6	24.1	226.2
PRE DEVELOPMENT LOADS (WITH BMPS)	10707.6	24.1	226.2
PRE DEVELOPMENT LOAD REDUCTION DUE TO BMPS	0.0	0.0	0.0
PROPOSED PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	NA	0.0%	0.0%
POST DEVELOPMENT LOADS (NO BMPS)	5665.2	12.8	119.7
POST DEVELOPMENT LOADS (WITH BMPS)	5180.5	12.5	112.9
POST DEVELOPMENT LOAD REDUCTION DUE TO BMPS	484.7	0.2	6.8
POST DEVELOPMENT - PRE DEVELOPMENT (SHOULD BE 0 OR NEGATIVE)	-5527.0	-11.6	-113.4
% DIFFERENCE FROM PRE DEVELOPMENT LOADS (SHOULD BE 0 OR NEGATIVE)	-51.6%	-48.1%	-50.1%
TOTAL REMOVAL EFFICIENCY NEEDED TO MEET PRE-DEVELOPMENT LOAD	-89.0%	-89.0%	-89.0%

2015-04-15	(603) 271-2304 PO Box 95, Concord, NH 03302-0095 www.des.nh.gov	Tab 6 of 9
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Date (MM/DD/YYYY): 4/29/2017
Project Name: Walpole-Charlestown 14747 Reconstruct NH 1
Town/City: Walpole and Charlestown NH
Impacted Surface Waters: Connecticut River
Applicant: New Hampshire Department of Transportation
DES File #:

TOTAL POST DEVELOPMENT - PRE DEVELOPMENT (SHOULD BE 0 OR NEGATIVE) (lbs/yr)	-5527.0
% DIFFERENCE FROM PRE DEVELOPMENT LOADS (SHOULD BE 0 OR NEGATIVE)	-51.6%
TOTAL REMOVAL EFFICIENCY NEEDED TO MEET PRE-DEVELOPMENT LOAD	-89.0%
CURRENTLY PROPOSED REMOVAL EFFICIENCY	8.6%
REMAINING REMOVAL EFFICIENCY NECESSARY TO MEET PRE-DEVELOPMENT LOAD	-97.6%

PRE-DEVELOPMENT

PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
PRE	1-N PRE	1	4.02	2.45	NA	TSS	NA	no treatment	3113.9	3113.9	0.0	0.0%
PRE	1-T PRE	1	0.00	0.00	NA	TSS	NA	no treatment	0.0	0.0	0.0	0.0%
PRE	2-N PRE	2	2.18	1.35	NA	TSS	NA	no treatment	1715.4	1715.4	0.0	0.0%
PRE	2-T PRE	2	0.00	0.00	NA	TSS	NA	no treatment	0.0	0.0	0.0	0.0%
PRE	3-N PRE	3	4.66	2.88	NA	TSS	NA	no treatment	3654.2	3654.2	0.0	0.0%
PRE	3-T PRE	3	0.00	0.00	NA	TSS	NA	no treatment	0.0	0.0	0.0	0.0%
PRE	4-N PRE	4	2.53	1.77	NA	TSS	NA	no treatment	2224.1	2224.1	0.0	0.0%
PRE	4-T PRE	4	0.00	0.00	NA	TSS	NA	no treatment	0.0	0.0	0.0	0.0%
TOTAL		13.38	8.44					TOTAL	10707.6	10707.6	0.0	0.0%

POST-DEVELOPMENT

PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
POST	1-N POST	1	1.78	1.45	0.00	TSS	NA	no treatment	1808.6	1808.6	0.0	0.0%
POST	1-T POST	1	2.24	0.00	0.00	TSS	NA	Infiltration	145.1	14.5	130.5	90.0%
POST	2-N POST	2	1.00	0.80	0.00	TSS	NA	no treatment	994.1	994.1	0.0	0.0%
POST	2-T POST	2	1.18	0.00	0.00	TSS	NA	Infiltration	76.3	7.6	68.7	90.0%
POST	3-N POST	3	0.52	0.43	0.00	TSS	NA	no treatment	535.0	535.0	0.0	0.0%
POST	3-T POST	3	4.14	0.00	0.00	TSS	NA	Infiltration	268.0	26.8	241.2	90.0%
POST	4-N POST	4	1.77	1.44	0.00	TSS	NA	no treatment	1789.0	1789.0	0.0	0.0%
POST	4-T POST	4	0.76	0.00	0.00	TSS	NA	Infiltration	49.2	4.9	44.3	90.0%
		TOTAL	13.38	4.12	0.00			TOTAL	5665.2	5180.5	484.7	8.6%

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Pollutant Loading Spreadsheet Model simple_method TOTAL SUMMARY
TP SUB_AREA SUMMARY

6/22/2017

Date (MM/DD/YYYY): 4/29/2017
 Project Name: Walpole-Charlestown 14747 Reconstruct NH 12
 Town/City: Walpole and Charlestown NH
 Impacted Surface Waters: Connecticut River
 Applicant: New Hampshire Department of Transportation
 DES File #:

TOTAL POST DEVELOPMENT - PRE DEVELOPMENT (SHOULD BE 0 OR NEGATIVE) (lbs/yr)	-11.6
% DIFFERENCE FROM PRE DEVELOPMENT LOADS (SHOULD BE 0 OR NEGATIVE)	-48.1%
TOTAL REMOVAL EFFICIENCY NEEDED TO MEET PRE-DEVELOPMENT LOAD	-89.0%
CURRENTLY PROPOSED REMOVAL EFFICIENCY	1.9%
REMAINING REMOVAL EFFICIENCY NECESSARY TO MEET PRE-DEVELOPMENT LOAD	-91.0%

PRE-DEVELOPMENT

PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
PRE	1-N PRE	1	4.02	2.45	NA	TP	NA	no treatment	7.0	7.0	0.0	0.0%
PRE	1-T PRE	1	0.00	0.00	NA	TP	NA	no treatment	0.0	0.0	0.0	0.0%
PRE	2-N PRE	2	2.18	1.35	NA	TP	NA	no treatment	3.9	3.9	0.0	0.0%
PRE	2-T PRE	2	0.00	0.00	NA	TP	NA	no treatment	0.0	0.0	0.0	0.0%
PRE	3-N PRE	3	4.66	2.88	NA	TP	NA	no treatment	8.2	8.2	0.0	0.0%
PRE	3-T PRE	3	0.00	0.00	NA	TP	NA	no treatment	0.0	0.0	0.0	0.0%
PRE	4-N PRE	4	2.53	1.77	NA	TP	NA	no treatment	5.0	5.0	0.0	0.0%
PRE	4-T PRE	4	0.00	0.00	NA	TP	NA	no treatment	0.0	0.0	0.0	0.0%
	TOTAL		13.38	8.44				TOTAL	24.1	24.1	0.0	0.0%

POST-DEVELOPMENT

PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
POST	1-N POST	1	1.78	1.45	0.00	TP	0.0%	no treatment	4.1	4.1	0.0	0.0%
POST	1-T POST	1	2.24	0.00	0.00	TP	0.0%	Infiltration	0.3	0.3	0.0	10.0%
POST	2-N POST	2	1.00	0.80	0.00	TP	0.0%	no treatment	2.2	2.2	0.0	0.0%
POST	2-T POST	2	1.18	0.00	0.00	TP	0.0%	Infiltration	0.2	0.1	0.1	55.0%
POST	3-N POST	3	0.52	0.43	0.00	TP	0.0%	no treatment	1.2	1.2	0.0	0.0%
POST	3-T POST	3	4.14	0.00	0.00	TP	0.0%	Infiltration	0.6	0.5	0.1	10.0%
POST	4-N POST	4	1.77	1.44	0.00	TP	0.0%	no treatment	4.0	4.0	0.0	0.0%
POST	4-T POST	4	0.76	0.00	0.00	TP	0.0%	Infiltration	0.1	0.0	0.1	55.0%
	TOTAL		13.38	4.12	0.00			TOTAL	12.8	12.5	0.2	1.9%

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Date (MM/DD/YYYY): 4/29/2017
Project Name: Walpole-Charlestown 14747 Reconstruct NH 1
Town/City: Walpole and Charlestown NH
Impacted Surface Waters: Connecticut River
Applicant: New Hampshire Department of Transportation
DES File #:

TOTAL POST DEVELOPMENT - PRE DEVELOPMENT (SHOULD BE 0 OR NEGATIVE) (lbs/yr)	-113.4
% DIFFERENCE FROM PRE DEVELOPMENT LOADS (SHOULD BE 0 OR NEGATIVE)	-50.1%
TOTAL REMOVAL EFFICIENCY NEEDED TO MEET PRE-DEVELOPMENT LOAD	-89.0%
CURRENTLY PROPOSED REMOVAL EFFICIENCY	5.7%
REMAINING REMOVAL EFFICIENCY NECESSARY TO MEET PRE-DEVELOPMENT LOAD	-94.7%

PRE-DEVELOPMENT

PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
PRE	1-N PRE	1	4.02	2.45	NA	TN	NA	no treatment	65.8	65.8	0.0	0.0%
PRE	1-T PRE	1	0.00	0.00	NA	TN	NA	no treatment	0.0	0.0	0.0	0.0%
PRE	2-N PRE	2	2.18	1.35	NA	TN	NA	no treatment	36.2	36.2	0.0	0.0%
PRE	2-T PRE	2	0.00	0.00	NA	TN	NA	no treatment	0.0	0.0	0.0	0.0%
PRE	3-N PRE	3	4.66	2.88	NA	TN	NA	no treatment	77.2	77.2	0.0	0.0%
PRE	3-T PRE	3	0.00	0.00	NA	TN	NA	no treatment	0.0	0.0	0.0	0.0%
PRE	4-N PRE	4	2.53	1.77	NA	TN	NA	no treatment	47.0	47.0	0.0	0.0%
PRE	4-T PRE	4	0.00	0.00	NA	TN	NA	no treatment	0.0	0.0	0.0	0.0%
TOTAL		13.38	8.44					TOTAL	226.2	226.2	0.0	0.0%

POST-DEVELOPMENT

PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
POST	1-N POST	1	1.78	1.45	0.00	TN	0.0%	no treatment	38.2	38.2	0.0	0.0%
POST	1-T POST	1	2.24	0.00	0.00	TN	0.0%	Infiltration	3.1	1.2	1.8	60.0%
POST	2-N POST	2	1.00	0.80	0.00	TN	0.0%	no treatment	21.0	21.0	0.0	0.0%
POST	2-T POST	2	1.18	0.00	0.00	TN	0.0%	Infiltration	1.6	0.6	1.0	60.0%
POST	3-N POST	3	0.52	0.43	0.00	TN	0.0%	no treatment	11.3	11.3	0.0	0.0%
POST	3-T POST	3	4.14	0.00	0.00	TN	0.0%	Infiltration	5.7	2.3	3.4	60.0%
POST	4-N POST	4	1.77	1.44	0.00	TN	0.0%	no treatment	37.8	37.8	0.0	0.0%
POST	4-T POST	4	0.76	0.00	0.00	TN	0.0%	Infiltration	1.0	0.4	0.6	60.0%
		TOTAL	12.28	11.12	0.00			TOTAL	119.7	112.9	6.8	5.7%

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Pollutant Loading Spreadsheet Model simple_method TOTAL SEGMENT 1
 OVERALL SUMMARY

6/22/2017

Date (MM/DD/YYYY): **4/29/2017**
 Project Name: **Walpole-Charlestown 14747 Reconstruct NH 12**
 Town/City: **Walpole and Charlestown NH**
 Impacted Surface Waters: **Connecticut River**
 Applicant: **New Hampshire Department of Transportation**
 DES File #:

TOTAL PRE -DEVELOPMENT (PRE-DEV) AREA (ACRES) =	4.02
TOTAL PRE-DEV EFFECTIVE IMPERVIOUS AREA (ACRES) =	2.45
TOTAL PRE-DEV PERCENT EFFECTIVE IMPERVIOUS (%) =	60.9%
TOTAL POST DEVELOPMENT (POST-DEV) AREA (ACRES) =	4.02
TOTAL POST-DEV EFFECTIVE IMPERVIOUS AREA (ACRES) =	1.45
TOTAL POST-DEV PERCENT EFFECTIVE IMPERVIOUS (%) =	36.1%
TOTAL POST-DEV AREA THAT IS FERTILIZED ANNUALLY (ACRES) =	0.00
TOTAL POST-DEV PERCENT OF AREA THAT IS FERTILIZED ANNUALLY (%) =	0.0%

	TSS (LBS/YR)	TP (LBS/YR)	TN (LBS/YR)
PRE DEVELOPMENT LOADS (NO BMPS)	3113.9	7.0	65.8
PRE DEVELOPMENT LOADS (WITH BMPS)	3113.9	7.0	65.8
PRE DEVELOPMENT LOAD REDUCTION DUE TO BMPS	0.0	0.0	0.0
PROPOSED PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	NA	0.0%	0.0%
POST DEVELOPMENT LOADS (NO BMPS)	1953.6	4.4	41.3
POST DEVELOPMENT LOADS (WITH BMPS)	1823.1	4.4	39.4
POST DEVELOPMENT LOAD REDUCTION DUE TO BMPS	130.5	0.0	1.8
POST DEVELOPMENT - PRE DEVELOPMENT (SHOULD BE 0 OR NEGATIVE)	-1290.8	-2.6	-26.4
% DIFFERENCE FROM PRE DEVELOPMENT LOADS (SHOULD BE 0 OR NEGATIVE)	-41.5%	-37.7%	-40.1%
TOTAL REMOVAL EFFICIENCY NEEDED TO MEET PRE-DEVELOPMENT LOAD	-59.4%	-59.4%	-59.4%

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Pollutant Loading Spreadsheet Model simple_method TOTAL SEGMENT 1
TSS SUB_AREA SUMMARY

6/22/2017

Date (MM/DD/YYYY): 4/29/2017
 Project Name: Walpole-Charlestown 14747 Reconstruct NH 12
 Town/City: Walpole and Charlestown NH
 Impacted Surface Waters: Connecticut River
 Applicant: New Hampshire Department of Transportation
 DES File #:

TOTAL POST DEVELOPMENT - PRE DEVELOPMENT (SHOULD BE 0 OR NEGATIVE) (lbs/yr)	-1290.8
% DIFFERENCE FROM PRE DEVELOPMENT LOADS (SHOULD BE 0 OR NEGATIVE)	-41.5%
TOTAL REMOVAL EFFICIENCY NEEDED TO MEET PRE-DEVELOPMENT LOAD	-59.4%
CURRENTLY PROPOSED REMOVAL EFFICIENCY	6.7%
REMAINING REMOVAL EFFICIENCY NECESSARY TO MEET PRE-DEVELOPMENT LOAD	-66.1%

PRE-DEVELOPMENT

PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
PRE	1-N PRE	1	4.02	2.45	NA	TSS	NA	no treatment	3113.9	3113.9	0.0	0.0%
PRE	1-T PRE	1	0.00	0.00	NA	TSS	NA	no treatment	0.0	0.0	0.0	0.0%
	TOTAL		4.02	2.45				TOTAL	3113.9	3113.9	0.0	0.0%

POST-DEVELOPMENT

PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
POST	1-N POST	1	1.78	1.45	0.00	TSS	NA	no treatment	1808.6	1808.6	0.0	0.0%
POST	1-T POST	1	2.24	0.00	0.00	TSS	NA	Infiltration	145.1	14.5	130.5	90.0%
	TOTAL		4.02	1.45	0.00			TOTAL	1953.6	1823.1	130.5	6.7%

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2015-04-15							

Date (MM/DD/YYYY): 4/29/2017
Project Name: Walpole-Charlestown 14747 Reconstruct NH 12
Town/City: Walpole and Charlestown NH
Impacted Surface Waters: Connecticut River
Applicant: New Hampshire Department of Transportation
DES File #:

TOTAL POST DEVELOPMENT - PRE DEVELOPMENT (SHOULD BE 0 OR NEGATIVE) (lbs/yr)	-2.6
% DIFFERENCE FROM PRE DEVELOPMENT LOADS (SHOULD BE 0 OR NEGATIVE)	-37.7%
TOTAL REMOVAL EFFICIENCY NEEDED TO MEET PRE-DEVELOPMENT LOAD	-59.4%
CURRENTLY PROPOSED REMOVAL EFFICIENCY	0.7%
REMAINING REMOVAL EFFICIENCY NECESSARY TO MEET PRE-DEVELOPMENT LOAD	-60.1%

PRE-DEVELOPMENT

PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
PRE	1-N PRE	1	4.02	2.45	NA	TP	NA	no treatment	7.0	7.0	0.0	0.0%
PRE	1-T PRE	1	0.00	0.00	NA	TP	NA	no treatment	0.0	0.0	0.0	0.0%
	TOTAL		4.02	2.45				TOTAL	7.0	7.0	0.0	0.0%

POST-DEVELOPMENT

PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
POST	1-N POST	1	1.78	1.45	0.00	TP	0.0%	no treatment	4.1	4.1	0.0	0.0%
POST	1-T POST	1	2.24	0.00	0.00	TP	0.0%	Infiltration	0.3	0.3	0.0	10.0%
		TOTAL	4.02	1.45	0.00			TOTAL	4.4	4.4	0.0	0.7%

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Date (MM/DD/YYYY): 4/29/2017
 Project Name: Walpole-Charlestown 14747 Reconstruct NH 12
 Town/City: Walpole and Charlestown NH
 Impacted Surface Waters: Connecticut River
 Applicant: New Hampshire Department of Transportation
 DES File #:

TOTAL POST DEVELOPMENT - PRE DEVELOPMENT (SHOULD BE 0 OR NEGATIVE) (lbs/yr)	-26.4
% DIFFERENCE FROM PRE DEVELOPMENT LOADS (SHOULD BE 0 OR NEGATIVE)	-40.1%
TOTAL REMOVAL EFFICIENCY NEEDED TO MEET PRE-DEVELOPMENT LOAD	-59.4%
CURRENTLY PROPOSED REMOVAL EFFICIENCY	4.5%
REMAINING REMOVAL EFFICIENCY NECESSARY TO MEET PRE-DEVELOPMENT LOAD	-63.8%

PRE-DEVELOPMENT

PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
PRE	1-N PRE	1	4.02	2.45	NA	TN	NA	no treatment	65.8	65.8	0.0	0.0%
PRE	1-T PRE	1	0.00	0.00	NA	TN	NA	no treatment	0.0	0.0	0.0	0.0%
	TOTAL		4.02	2.45				TOTAL	65.8	65.8	0.0	0.0%

POST-DEVELOPMENT

PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
POST	1-N POST	1	1.78	1.45	0.00	TN	0.0%	no treatment	38.2	38.2	0.0	0.0%
POST	1-T POST	1	2.24	0.00	0.00	TN	0.0%	Infiltration	3.1	1.2	1.8	60.0%
	TOTAL		4.02	1.45	0.00			TOTAL	41.3	39.4	1.8	4.5%

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2015-04-15

Pollutant Loading Spreadsheet Model simple_method TOTAL SEGMENT 2
 OVERALL SUMMARY

6/22/2017

Date (MM/DD/YYYY): **4/29/2017**
 Project Name: **Walpole-Charlestown 14747 Reconstruct NH 12**
 Town/City: **Walpole and Charlestown NH**
 Impacted Surface Waters: **Connecticut River**
 Applicant: **New Hampshire Department of Transportation**
 DES File #:

TOTAL PRE -DEVELOPMENT (PRE-DEV) AREA (ACRES) =	2.18
TOTAL PRE-DEV EFFECTIVE IMPERVIOUS AREA (ACRES) =	1.35
TOTAL PRE-DEV PERCENT EFFECTIVE IMPERVIOUS (%) =	62.0%
TOTAL POST DEVELOPMENT (POST-DEV) AREA (ACRES) =	2.18
TOTAL POST-DEV EFFECTIVE IMPERVIOUS AREA (ACRES) =	0.80
TOTAL POST-DEV PERCENT EFFECTIVE IMPERVIOUS (%) =	36.6%
TOTAL POST-DEV AREA THAT IS FERTILIZED ANNUALLY (ACRES) =	0.00
TOTAL POST-DEV PERCENT OF AREA THAT IS FERTILIZED ANNUALLY (%) =	0.0%

	TSS (LBS/YR)	TP (LBS/YR)	TN (LBS/YR)
PRE DEVELOPMENT LOADS (NO BMPS)	1715.4	3.9	36.2
PRE DEVELOPMENT LOADS (WITH BMPS)	1715.4	3.9	36.2
PRE DEVELOPMENT LOAD REDUCTION DUE TO BMPS	0.0	0.0	0.0
PROPOSED PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	NA	0.0%	0.0%
POST DEVELOPMENT LOADS (NO BMPS)	1070.4	2.4	22.6
POST DEVELOPMENT LOADS (WITH BMPS)	1001.7	2.3	21.6
POST DEVELOPMENT LOAD REDUCTION DUE TO BMPS	68.7	0.1	1.0
POST DEVELOPMENT - PRE DEVELOPMENT (SHOULD BE 0 OR NEGATIVE)	-713.6	-1.5	-14.6
% DIFFERENCE FROM PRE DEVELOPMENT LOADS (SHOULD BE 0 OR NEGATIVE)	-41.6%	-40.0%	-40.3%
TOTAL REMOVAL EFFICIENCY NEEDED TO MEET PRE-DEVELOPMENT LOAD	-60.2%	-60.2%	-60.2%

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Date (MM/DD/YYYY): 4/29/2017
Project Name: Walpole-Charlestown 14747 Reconstruct NH 1
Town/City: Walpole and Charlestown NH
Impacted Surface Waters: Connecticut River
Applicant: New Hampshire Department of Transportation
DES File #:

TOTAL POST DEVELOPMENT - PRE DEVELOPMENT (SHOULD BE 0 OR NEGATIVE) (lbs/yr)	-713.6
% DIFFERENCE FROM PRE DEVELOPMENT LOADS (SHOULD BE 0 OR NEGATIVE)	-41.6%
TOTAL REMOVAL EFFICIENCY NEEDED TO MEET PRE-DEVELOPMENT LOAD	-60.2%
CURRENTLY PROPOSED REMOVAL EFFICIENCY	6.4%
REMAINING REMOVAL EFFICIENCY NECESSARY TO MEET PRE-DEVELOPMENT LOAD	-66.7%

PRE-DEVELOPMENT

PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
PRE	2-N PRE	2	2.18	1.35	NA	TSS	NA	no treatment	1715.4	1715.4	0.0	0.0%
PRE	2-T PRE	2	0.00	0.00	NA	TSS	NA	no treatment	0.0	0.0	0.0	0.0%
		TOTAL	2.18	1.35				TOTAL	1715.4	1715.4	0.0	0.0%

POST-DEVELOPMENT

PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
POST	2-N POST	2	1.00	0.80	0.00	TSS	NA	no treatment	994.1	994.1	0.0	0.0%
POST	2-T POST	2	1.18	0.00	0.00	TSS	NA	Infiltration	76.3	7.6	68.7	90.0%
		TOTAL	2.18	0.80	0.00			TOTAL	1070.4	1001.7	68.7	6.4%

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Date (MM/DD/YYYY): 4/29/2017
Project Name: Walpole-Charlestown 14747 Reconstruct NH 12
Town/City: Walpole and Charlestown NH
Impacted Surface Waters: Connecticut River
Applicant: New Hampshire Department of Transportation
DES File #:

TOTAL POST DEVELOPMENT - PRE DEVELOPMENT (SHOULD BE 0 OR NEGATIVE) (lbs/yr)	-1.5
% DIFFERENCE FROM PRE DEVELOPMENT LOADS (SHOULD BE 0 OR NEGATIVE)	-40.0%
TOTAL REMOVAL EFFICIENCY NEEDED TO MEET PRE-DEVELOPMENT LOAD	-60.2%
CURRENTLY PROPOSED REMOVAL EFFICIENCY	3.9%
REMAINING REMOVAL EFFICIENCY NECESSARY TO MEET PRE-DEVELOPMENT LOAD	-64.2%

PRE-DEVELOPMENT

PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
PRE	2-N PRE	2	2.18	1.35	NA	TP	NA	no treatment	3.9	3.9	0.0	0.0%
PRE	2-T PRE	2	0.00	0.00	NA	TP	NA	no treatment	0.0	0.0	0.0	0.0%
	TOTAL		2.18	1.35				TOTAL	3.9	3.9	0.0	0.0%

POST-DEVELOPMENT

PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
POST	2-N POST	2	1.00	0.80	0.00	TP	0.0%	no treatment	2.2	2.2	0.0	0.0%
POST	2-T POST	2	1.18	0.00	0.00	TP	0.0%	Infiltration	0.2	0.1	0.1	55.0%
		TOTAL	2.18	0.80	0.00			TOTAL	2.4	2.3	0.1	1.9%

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Date (MM/DD/YYYY): 4/29/2017
 Project Name: Walpole-Charlestown 14747 Reconstruct NH 12
 Town/City: Walpole and Charlestown NH
 Impacted Surface Waters: Connecticut River
 Applicant: New Hampshire Department of Transportation
 DES File #:

TOTAL POST DEVELOPMENT - PRE DEVELOPMENT (SHOULD BE 0 OR NEGATIVE) (lbs/yr)	-14.6
% DIFFERENCE FROM PRE DEVELOPMENT LOADS (SHOULD BE 0 OR NEGATIVE)	-40.3%
TOTAL REMOVAL EFFICIENCY NEEDED TO MEET PRE-DEVELOPMENT LOAD	-60.2%
CURRENTLY PROPOSED REMOVAL EFFICIENCY	4.3%
REMAINING REMOVAL EFFICIENCY NECESSARY TO MEET PRE-DEVELOPMENT LOAD	-64.5%

PRE-DEVELOPMENT

PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
PRE	2-N PRE	2	2.18	1.35	NA	TN	NA	no treatment	36.2	36.2	0.0	0.0%
PRE	2-T PRE	2	0.00	0.00	NA	TN	NA	no treatment	0.0	0.0	0.0	0.0%
	TOTAL		2.18	1.35				TOTAL	36.2	36.2	0.0	0.0%

POST-DEVELOPMENT

PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
POST	2-N POST	2	1.00	0.80	0.00	TN	0.0%	no treatment	21.0	21.0	0.0	0.0%
POST	2-T POST	2	1.18	0.00	0.00	TN	0.0%	Infiltration	1.6	0.6	1.0	60.0%
	TOTAL		2.18	0.80	0.00			TOTAL	22.6	21.6	1.0	4.3%

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Pollutant Loading Spreadsheet Model simple_method TOTAL SEGMENT 3
 OVERALL SUMMARY

6/22/2017

Date (MM/DD/YYYY): **4/29/2017**
 Project Name: **Walpole-Charlestown 14747 Reconstruct NH 12**
 Town/City: **Walpole and Charlestown NH**
 Impacted Surface Waters: **Connecticut River**
 Applicant: **New Hampshire Department of Transportation**
 DES File #:

TOTAL PRE -DEVELOPMENT (PRE-DEV) AREA (ACRES) =	4.66
TOTAL PRE-DEV EFFECTIVE IMPERVIOUS AREA (ACRES) =	2.88
TOTAL PRE-DEV PERCENT EFFECTIVE IMPERVIOUS (%) =	61.7%
TOTAL POST DEVELOPMENT (POST-DEV) AREA (ACRES) =	4.66
TOTAL POST-DEV EFFECTIVE IMPERVIOUS AREA (ACRES) =	0.43
TOTAL POST-DEV PERCENT EFFECTIVE IMPERVIOUS (%) =	9.2%
TOTAL POST-DEV AREA THAT IS FERTILIZED ANNUALLY (ACRES) =	0.00
TOTAL POST-DEV PERCENT OF AREA THAT IS FERTILIZED ANNUALLY (%) =	0.0%

	TSS (LBS/YR)	TP (LBS/YR)	TN (LBS/YR)
PRE DEVELOPMENT LOADS (NO BMPS)	3654.2	8.2	77.2
PRE DEVELOPMENT LOADS (WITH BMPS)	3654.2	8.2	77.2
PRE DEVELOPMENT LOAD REDUCTION DUE TO BMPS	0.0	0.0	0.0
PROPOSED PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	NA	0.0%	0.0%
POST DEVELOPMENT LOADS (NO BMPS)	803.0	1.8	17.0
POST DEVELOPMENT LOADS (WITH BMPS)	561.8	1.7	13.6
POST DEVELOPMENT LOAD REDUCTION DUE TO BMPS	241.2	0.1	3.4
POST DEVELOPMENT - PRE DEVELOPMENT (SHOULD BE 0 OR NEGATIVE)	-3092.4	-6.5	-63.6
% DIFFERENCE FROM PRE DEVELOPMENT LOADS (SHOULD BE 0 OR NEGATIVE)	-84.6%	-78.8%	-82.4%
TOTAL REMOVAL EFFICIENCY NEEDED TO MEET PRE-DEVELOPMENT LOAD	-355.1%	-355.1%	-355.1%

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Pollutant Loading Spreadsheet Model simple_method TOTAL SEGMENT 3
TSS SUB_AREA SUMMARY

6/22/2017

Date (MM/DD/YYYY): 4/29/2017
 Project Name: Walpole-Charlestown 14747 Reconstruct NH 12
 Town/City: Walpole and Charlestown NH
 Impacted Surface Waters: Connecticut River
 Applicant: New Hampshire Department of Transportation
 DES File #:

TOTAL POST DEVELOPMENT - PRE DEVELOPMENT (SHOULD BE 0 OR NEGATIVE) (lbs/yr)	-3092.4
% DIFFERENCE FROM PRE DEVELOPMENT LOADS (SHOULD BE 0 OR NEGATIVE)	-84.6%
TOTAL REMOVAL EFFICIENCY NEEDED TO MEET PRE-DEVELOPMENT LOAD	-355.1%
CURRENTLY PROPOSED REMOVAL EFFICIENCY	30.0%
REMAINING REMOVAL EFFICIENCY NECESSARY TO MEET PRE-DEVELOPMENT LOAD	-385.1%

PRE-DEVELOPMENT

PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
PRE	3-N PRE	3	4.66	2.88	NA	TSS	NA	no treatment	3654.2	3654.2	0.0	0.0%
PRE	3-T PRE	3	0.00	0.00	NA	TSS	NA	no treatment	0.0	0.0	0.0	0.0%
	TOTAL		4.66	2.88				TOTAL	3654.2	3654.2	0.0	0.0%

POST-DEVELOPMENT

PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
POST	3-N POST	3	0.52	0.43	0.00	TSS	NA	no treatment	535.0	535.0	0.0	0.0%
POST	3-T POST	3	4.14	0.00	0.00	TSS	NA	Infiltration	268.0	26.8	241.2	90.0%
	TOTAL		4.66	0.43	0.00			TOTAL	803.0	561.8	241.2	30.0%

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Date (MM/DD/YYYY): 4/29/2017
Project Name: Walpole-Charlestown 14747 Reconstruct NH 12
Town/City: Walpole and Charlestown NH
Impacted Surface Waters: Connecticut River
Applicant: New Hampshire Department of Transportation
DES File #:

TOTAL POST DEVELOPMENT - PRE DEVELOPMENT (SHOULD BE 0 OR NEGATIVE) (lbs/yr)	-6.5
% DIFFERENCE FROM PRE DEVELOPMENT LOADS (SHOULD BE 0 OR NEGATIVE)	-78.8%
TOTAL REMOVAL EFFICIENCY NEEDED TO MEET PRE-DEVELOPMENT LOAD	-355.1%
CURRENTLY PROPOSED REMOVAL EFFICIENCY	3.3%
REMAINING REMOVAL EFFICIENCY NECESSARY TO MEET PRE-DEVELOPMENT LOAD	-358.4%

PRE-DEVELOPMENT

PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
PRE	3-N PRE	3	4.66	2.88	NA	TP	NA	no treatment	8.2	8.2	0.0	0.0%
PRE	3-T PRE	3	0.00	0.00	NA	TP	NA	no treatment	0.0	0.0	0.0	0.0%
	TOTAL		4.66	2.88				TOTAL	8.2	8.2	0.0	0.0%

POST-DEVELOPMENT

PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
POST	3-N POST	3	0.52	0.43	0.00	TP	0.0%	no treatment	1.2	1.2	0.0	0.0%
POST	3-T POST	3	4.14	0.00	0.00	TP	0.0%	Infiltration	0.6	0.5	0.1	10.0%
	TOTAL		4.66	0.43	0.00			TOTAL	4.8	4.7	0.1	2.2%

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Date (MM/DD/YYYY): 4/29/2017
 Project Name: Walpole-Charlestown 14747 Reconstruct NH 12
 Town/City: Walpole and Charlestown NH
 Impacted Surface Waters: Connecticut River
 Applicant: New Hampshire Department of Transportation
 DES File #:

TOTAL POST DEVELOPMENT - PRE DEVELOPMENT (SHOULD BE 0 OR NEGATIVE) (lbs/yr)	-63.6
% DIFFERENCE FROM PRE DEVELOPMENT LOADS (SHOULD BE 0 OR NEGATIVE)	-82.4%
TOTAL REMOVAL EFFICIENCY NEEDED TO MEET PRE-DEVELOPMENT LOAD	-355.1%
CURRENTLY PROPOSED REMOVAL EFFICIENCY	20.0%
REMAINING REMOVAL EFFICIENCY NECESSARY TO MEET PRE-DEVELOPMENT LOAD	-375.1%

PRE-DEVELOPMENT

PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
PRE	3-N PRE	3	4.66	2.88	NA	TN	NA	no treatment	77.2	77.2	0.0	0.0%
PRE	3-T PRE	3	0.00	0.00	NA	TN	NA	no treatment	0.0	0.0	0.0	0.0%
	TOTAL		4.66	2.88				TOTAL	77.2	77.2	0.0	0.0%

POST-DEVELOPMENT

PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
POST	3-N POST	3	0.52	0.43	0.00	TN	0.0%	no treatment	11.3	11.3	0.0	0.0%
POST	3-T POST	3	4.14	0.00	0.00	TN	0.0%	Infiltration	5.7	2.3	3.4	60.0%
	TOTAL		4.66	0.43	0.00			TOTAL	17.0	13.6	3.4	20.0%

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Pollutant Loading Spreadsheet Model simple_method TOTAL SEGMENT 4
 OVERALL SUMMARY

6/22/2017

Date (MM/DD/YYYY): **4/29/2017**
 Project Name: **Walpole-Charlestown 14747 Reconstruct NH 12**
 Town/City: **Walpole and Charlestown NH**
 Impacted Surface Waters: **Connecticut River**
 Applicant: **New Hampshire Department of Transportation**
 DES File #:

TOTAL PRE -DEVELOPMENT (PRE-DEV) AREA (ACRES) =	2.53
TOTAL PRE-DEV EFFECTIVE IMPERVIOUS AREA (ACRES) =	1.77
TOTAL PRE-DEV PERCENT EFFECTIVE IMPERVIOUS (%) =	70.0%
TOTAL POST DEVELOPMENT (POST-DEV) AREA (ACRES) =	2.53
TOTAL POST-DEV EFFECTIVE IMPERVIOUS AREA (ACRES) =	1.44
TOTAL POST-DEV PERCENT EFFECTIVE IMPERVIOUS (%) =	56.8%
TOTAL POST-DEV AREA THAT IS FERTILIZED ANNUALLY (ACRES) =	0.00
TOTAL POST-DEV PERCENT OF AREA THAT IS FERTILIZED ANNUALLY (%) =	0.0%

	TSS (LBS/YR)	TP (LBS/YR)	TN (LBS/YR)
PRE DEVELOPMENT LOADS (NO BMPS)	2224.1	5.0	47.0
PRE DEVELOPMENT LOADS (WITH BMPS)	2224.1	5.0	47.0
PRE DEVELOPMENT LOAD REDUCTION DUE TO BMPS	0.0	0.0	0.0
PROPOSED PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	NA	0.0%	0.0%
POST DEVELOPMENT LOADS (NO BMPS)	1838.2	4.1	38.8
POST DEVELOPMENT LOADS (WITH BMPS)	1793.9	4.1	38.2
POST DEVELOPMENT LOAD REDUCTION DUE TO BMPS	44.3	0.1	0.6
POST DEVELOPMENT - PRE DEVELOPMENT (SHOULD BE 0 OR NEGATIVE)	-430.2	-0.9	-8.8
% DIFFERENCE FROM PRE DEVELOPMENT LOADS (SHOULD BE 0 OR NEGATIVE)	-19.3%	-18.6%	-18.7%
TOTAL REMOVAL EFFICIENCY NEEDED TO MEET PRE-DEVELOPMENT LOAD	-21.0%	-21.0%	-21.0%

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Date (MM/DD/YYYY): 4/29/2017
Project Name: Walpole-Charlestown 14747 Reconstruct NH 1
Town/City: Walpole and Charlestown NH
Impacted Surface Waters: Connecticut River
Applicant: New Hampshire Department of Transportation
DES File #:

TOTAL POST DEVELOPMENT - PRE DEVELOPMENT (SHOULD BE 0 OR NEGATIVE) (lbs/yr)	-430.2
% DIFFERENCE FROM PRE DEVELOPMENT LOADS (SHOULD BE 0 OR NEGATIVE)	-19.3%
TOTAL REMOVAL EFFICIENCY NEEDED TO MEET PRE-DEVELOPMENT LOAD	-21.0%
CURRENTLY PROPOSED REMOVAL EFFICIENCY	2.4%
REMAINING REMOVAL EFFICIENCY NECESSARY TO MEET PRE-DEVELOPMENT LOAD	-23.4%

PRE-DEVELOPMENT

PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
PRE	4-N PRE	4	2.53	1.77	NA	TSS	NA	no treatment	2224.1	2224.1	0.0	0.0%
PRE	4-T PRE	4	0.00	0.00	NA	TSS	NA	no treatment	0.0	0.0	0.0	0.0%
		TOTAL	2.53	1.77				TOTAL	2224.1	2224.1	0.0	0.0%

POST-DEVELOPMENT

PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
POST	4-N POST	4	1.77	1.44	0.00	TSS	NA	no treatment	1789.0	1789.0	0.0	0.0%
POST	4-T POST	4	0.76	0.00	0.00	TSS	NA	Infiltration	49.2	4.9	44.3	90.0%
		TOTAL	2.53	1.44	0.00			TOTAL	1838.2	1793.9	44.3	2.4%

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Project Name: Walpole-Charlestown 14747 Reconstruct NH 12
Town/City: Walpole and Charlestown NH
Impacted Surface Waters: Connecticut River
Applicant: New Hampshire Department of Transportation
DES File #:

TOTAL POST DEVELOPMENT - PRE DEVELOPMENT (SHOULD BE 0 OR NEGATIVE) (lbs/yr)	-0.9
% DIFFERENCE FROM PRE DEVELOPMENT LOADS (SHOULD BE 0 OR NEGATIVE)	-18.6%
TOTAL REMOVAL EFFICIENCY NEEDED TO MEET PRE-DEVELOPMENT LOAD	-21.0%
CURRENTLY PROPOSED REMOVAL EFFICIENCY	1.5%
REMAINING REMOVAL EFFICIENCY NECESSARY TO MEET PRE-DEVELOPMENT LOAD	-22.5%

PRE-DEVELOPMENT

PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
PRE	4-N PRE	4	2.53	1.77	NA	TP	NA	no treatment	5.0	5.0	0.0	0.0%
PRE	4-T PRE	4	0.00	0.00	NA	TP	NA	no treatment	0.0	0.0	0.0	0.0%
	TOTAL		2.53	1.77				TOTAL	5.0	5.0	0.0	0.0%

POST-DEVELOPMENT

PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
POST	4-N POST	4	1.77	1.44	0.00	TP	0.0%	no treatment	4.0	4.0	0.0	0.0%
POST	4-T POST	4	0.76	0.00	0.00	TP	0.0%	Infiltration	0.1	0.0	0.1	55.0%
	TOTAL		2.53	1.44	0.00			TOTAL	4.1	4.1	0.1	4.5%

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Date (MM/DD/YYYY): 4/29/2017
 Project Name: Walpole-Charlestown 14747 Reconstruct NH 12
 Town/City: Walpole and Charlestown NH
 Impacted Surface Waters: Connecticut River
 Applicant: New Hampshire Department of Transportation
 DES File #:

TOTAL POST DEVELOPMENT - PRE DEVELOPMENT (SHOULD BE 0 OR NEGATIVE) (lbs/yr)	-8.8
% DIFFERENCE FROM PRE DEVELOPMENT LOADS (SHOULD BE 0 OR NEGATIVE)	-18.7%
TOTAL REMOVAL EFFICIENCY NEEDED TO MEET PRE-DEVELOPMENT LOAD	-21.0%
CURRENTLY PROPOSED REMOVAL EFFICIENCY	1.6%
REMAINING REMOVAL EFFICIENCY NECESSARY TO MEET PRE-DEVELOPMENT LOAD	-22.6%

PRE-DEVELOPMENT

PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
PRE	4-N PRE	4	2.53	1.77	NA	TN	NA	no treatment	47.0	47.0	0.0	0.0%
PRE	4-T PRE	4	0.00	0.00	NA	TN	NA	no treatment	0.0	0.0	0.0	0.0%
	TOTAL		2.53	1.77				TOTAL	47.0	47.0	0.0	0.0%

POST-DEVELOPMENT

PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
POST	4-N POST	4	1.77	1.44	0.00	TN	0.0%	no treatment	37.8	37.8	0.0	0.0%
POST	4-T POST	4	0.76	0.00	0.00	TN	0.0%	Infiltration	1.0	0.4	0.6	60.0%
	TOTAL		2.53	1.44	0.00			TOTAL	38.8	38.2	0.6	1.6%

(603) 271-2304 PO Box 95, Concord, NH 03302-0095 www.des.nh.gov	Tab 9 of 9							
2015-04-15								

New Hampshire Department of Transportation
Walpole-Charlestown, X-A000(487),14747
N.H. Route 12 Reconstruction

POLLUTANT LOADING ANALYSIS REPORT

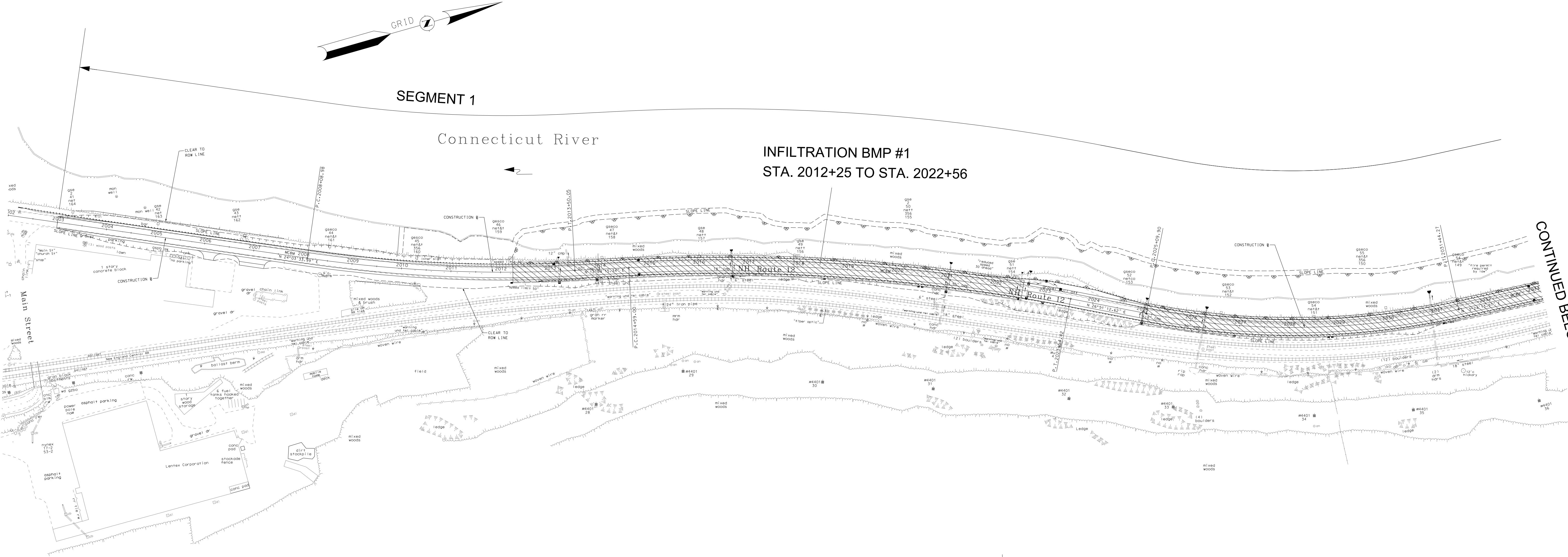
APPENDIX 2:

TSS/TN/TP POLLUTANT LOADING MAP

SEGMENT 1

Connecticut River

INFILTRATION BMP #1
STA. 2012+25 TO STA. 2022+56



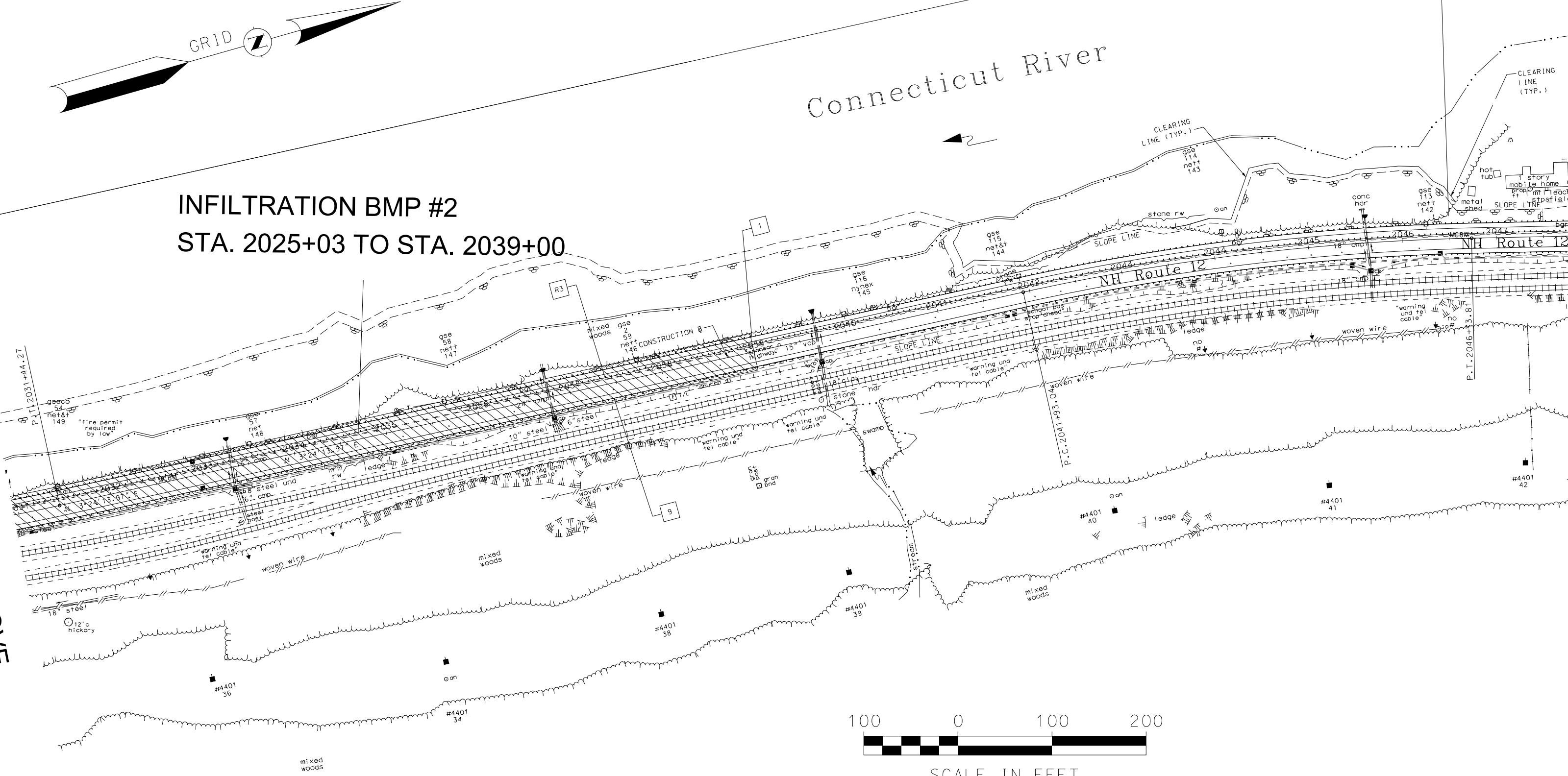
CONTINUED BELOW

SEGMENT 1

Connecticut River

INFILTRATION BMP #2
STA. 2025+03 TO STA. 2039+00

CONTINUED ABOVE



100 0 100 200
SCALE IN FEET

SEGMENT 1

TSS

PRE-DEVELOPMENT LOAD: 3,113.9 LBS/YR
POST-DEVELOPMENT LOAD: 1,823.1 LBS/YR

TP

PRE-DEVELOPMENT LOAD: 7.0 LBS/YR
POST-DEVELOPMENT LOAD: 4.4 LBS/YR

TN

PRE-DEVELOPMENT LOAD: 65.8 LBS/YR
POST-DEVELOPMENT LOAD: 39.4 LBS/YR

WALPOLE - CHARLESTOWN

14747

POLLUTANT LOADING MAP - SEGMENT 1

SHEET 1

N.H. ROUTE 12 RECONSTRUCTION

WALPOLE, NH

PLOT DATE: 6/22/2017

FILENAME: 14747Pollutant Loading Map TSS.dgn

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TWO EXECUTIVE PARK DRIVE
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SEGMENT 2

TSS

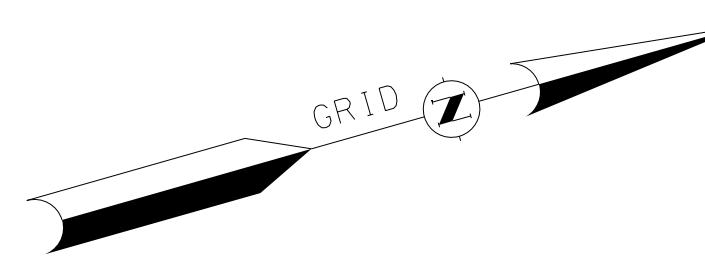
PRE-DEVELOPMENT LOAD: 1,715.4 LBS/YR
POST-DEVELOPMENT LOAD: 1,001.7 LBS/YR

TP

PRE-DEVELOPMENT LOAD: 3.9 LBS/YR
POST-DEVELOPMENT LOAD: 2.3 LBS/YR

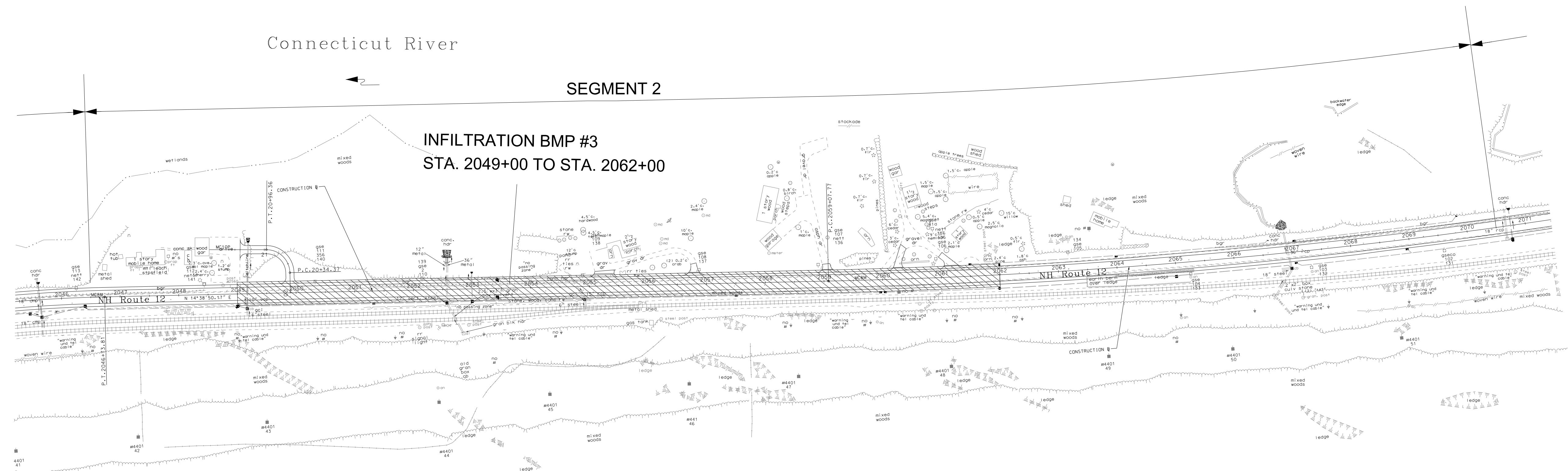
TN

PRE-DEVELOPMENT LOAD: 36.2 LBS/YR
POST-DEVELOPMENT LOAD: 21.6 LBS/YR



Connecticut River

SEGMENT 2



100 0 100 200
SCALE IN FEET

WALPOLE - CHARLESTOWN

14747

POLLUTANT LOADING MAP - SEGMENT 2

SHEET 2

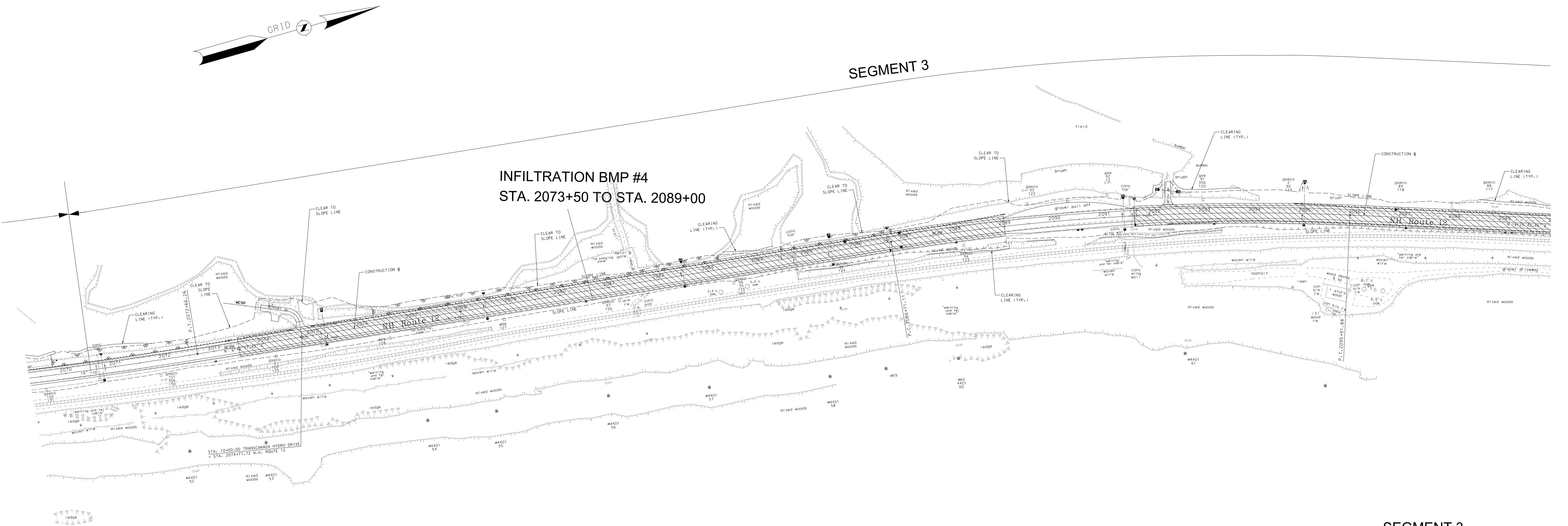
N.H. ROUTE 12 RECONSTRUCTION

WALPOLE, NH

PLOT DATE: 6/22/2017

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FILENAME: 14747Pollutant Loading Map TSS.dgn



SEGMENT 3

TSS

PRE-DEVELOPMENT LOAD: 3,654.2 LBS/YR
POST-DEVELOPMENT LOAD: 561.8 LBS/YR

TP

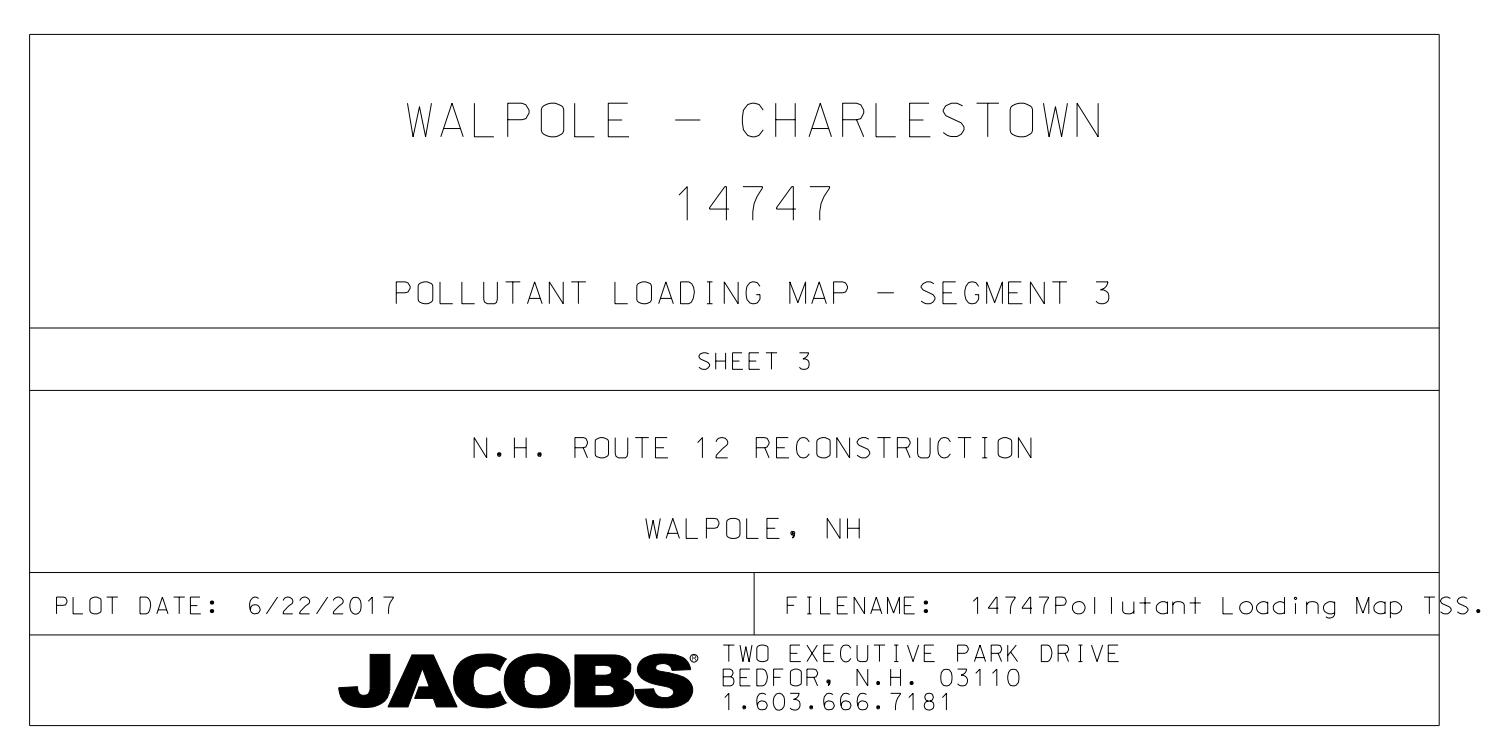
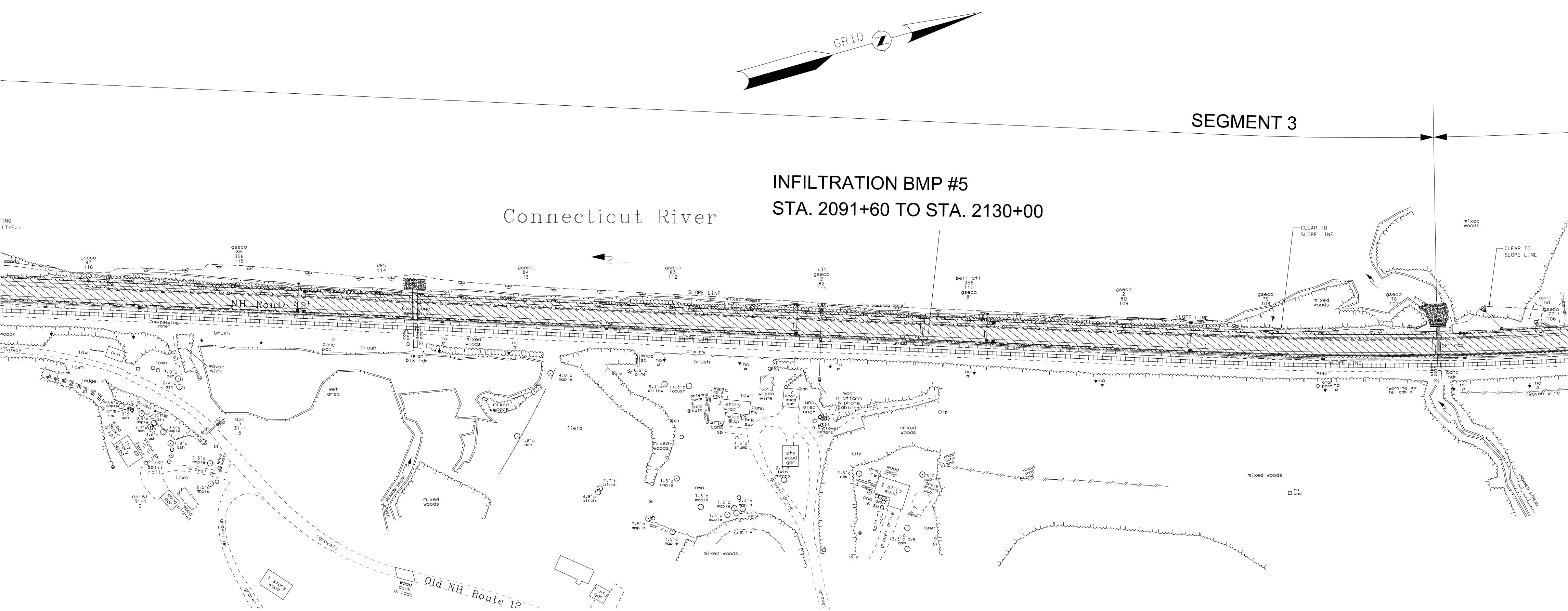
PRE-DEVELOPMENT LOAD: 8.2 LBS/YR
POST-DEVELOPMENT LOAD: 1.7 LBS/YR

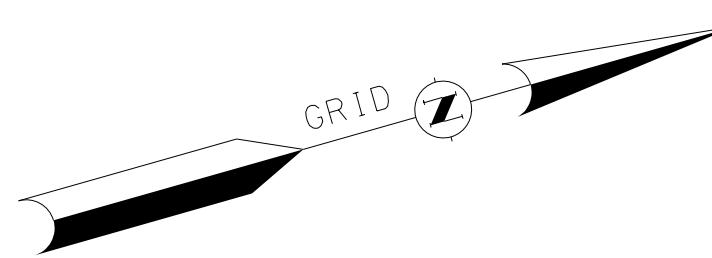
TN

PRE-DEVELOPMENT LOAD: 77.2 LBS/YR
POST-DEVELOPMENT LOAD: 13.6 LBS/YR

100 0 100 200
SCALE IN FEET

CONTINUED ABOVE





SEGMENT 4

TS

**PRE-DEVELOPMENT LOAD: 2,224.1 LBS/YR
POST-DEVELOPMENT LOAD: 1,793.9 LBS/YR**

TP

PRE-DEVELOPMENT LOAD: 5.0 LBS/YR

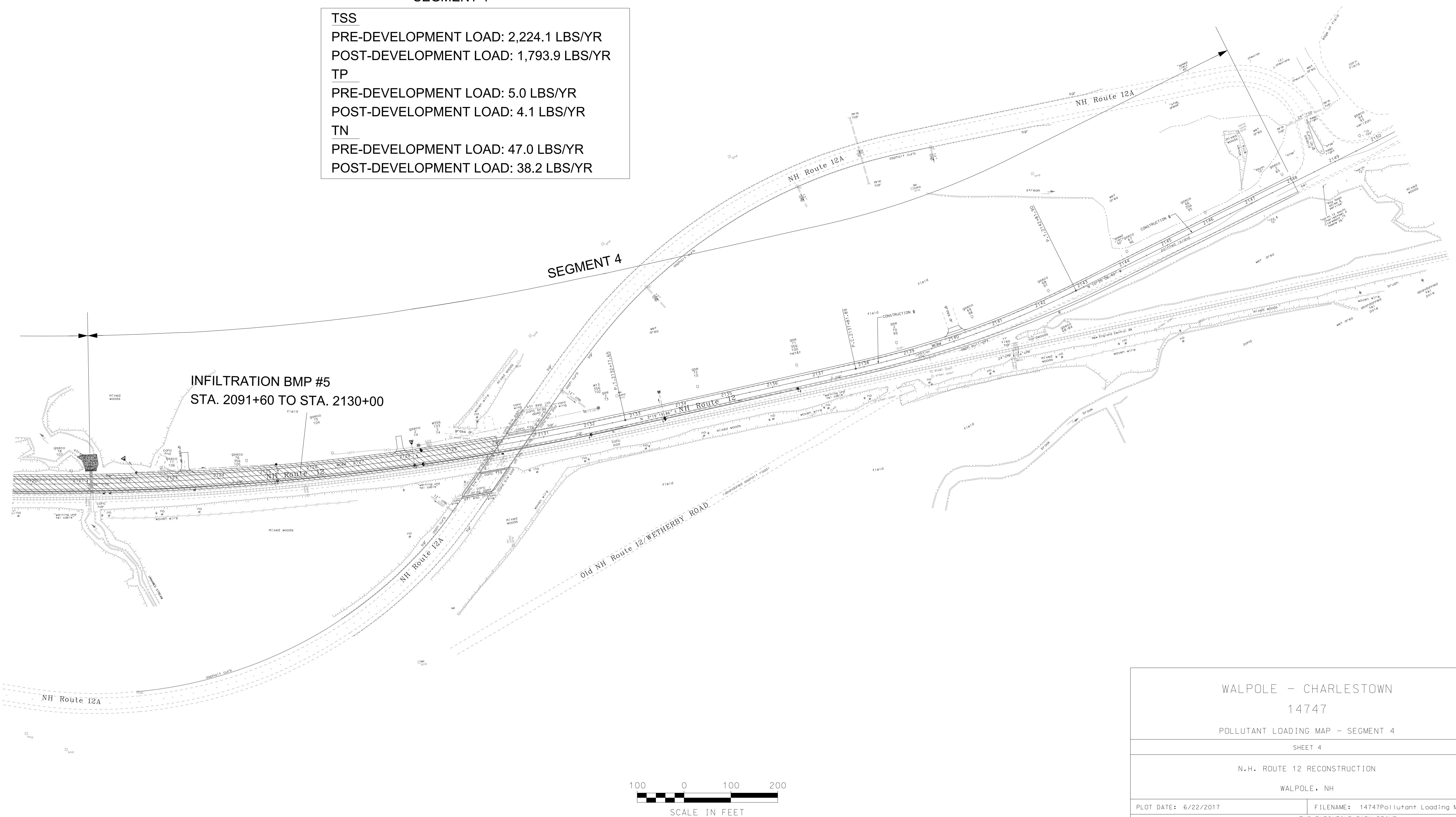
POST-DEVELOPMENT LOAD: 4.1 LBS/YR

TN

PRE-DEVELOPMENT LOAD: 47.0 LBS/YR
POST-DEVELOPMENT LOAD: 38.2 LBS/YR

INFILTRATION BMP #5

STA. 2091+60 TO STA. 2130+00



WAIPOLE = CHARLESTOWN

14747

POLLUTANT LOADING MAP – SEGMENT 4

SHEET 4

N.H. ROUTE 12 RECONSTRUCTION

WALPOLE, NH

FILENAME: 14747Pollutant Loading Map TSS.
D EXECUTIVE PARK DRIVE
DOFOR, N.H. 03110
603.666.7181

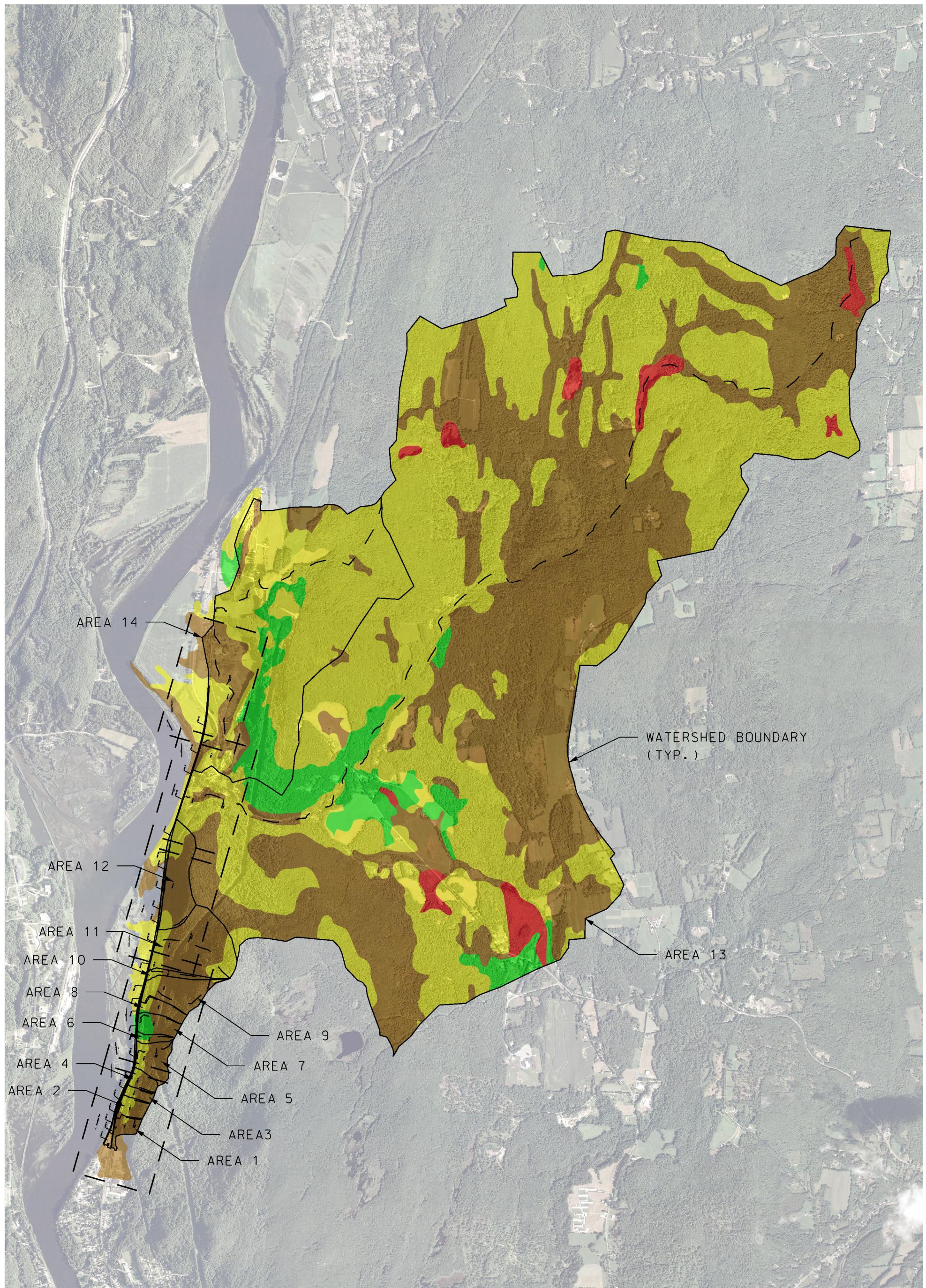
JACOBS® TWO EXECUTIVE PARK DRIVE
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1.603.666.7181

New Hampshire Department of Transportation
Walpole-Charlestown, X-A000(487),14747
N.H. Route 12 Reconstruction

POLLUTANT LOADING ANALYSIS REPORT

APPENDIX 3:

EXISTING WATERSHED PLANS



NRCS HYDROLOGIC SOIL GROUPS

TYPE A

1250 0 1250 2500
SCALE IN FEET

TYPE B

TYPE C

TYPE D

NOTE:
REFER TO SHEETS 2-6 FOR SMALLER
AREAS NOT IDENTIFIED ON THIS PLAN.

WALPOLE - CHARLESTOWN

14747

EXISTING WATERSHED & SOILS PLAN

SHEET 1

N.H. ROUTE 12 RECONSTRUCTION

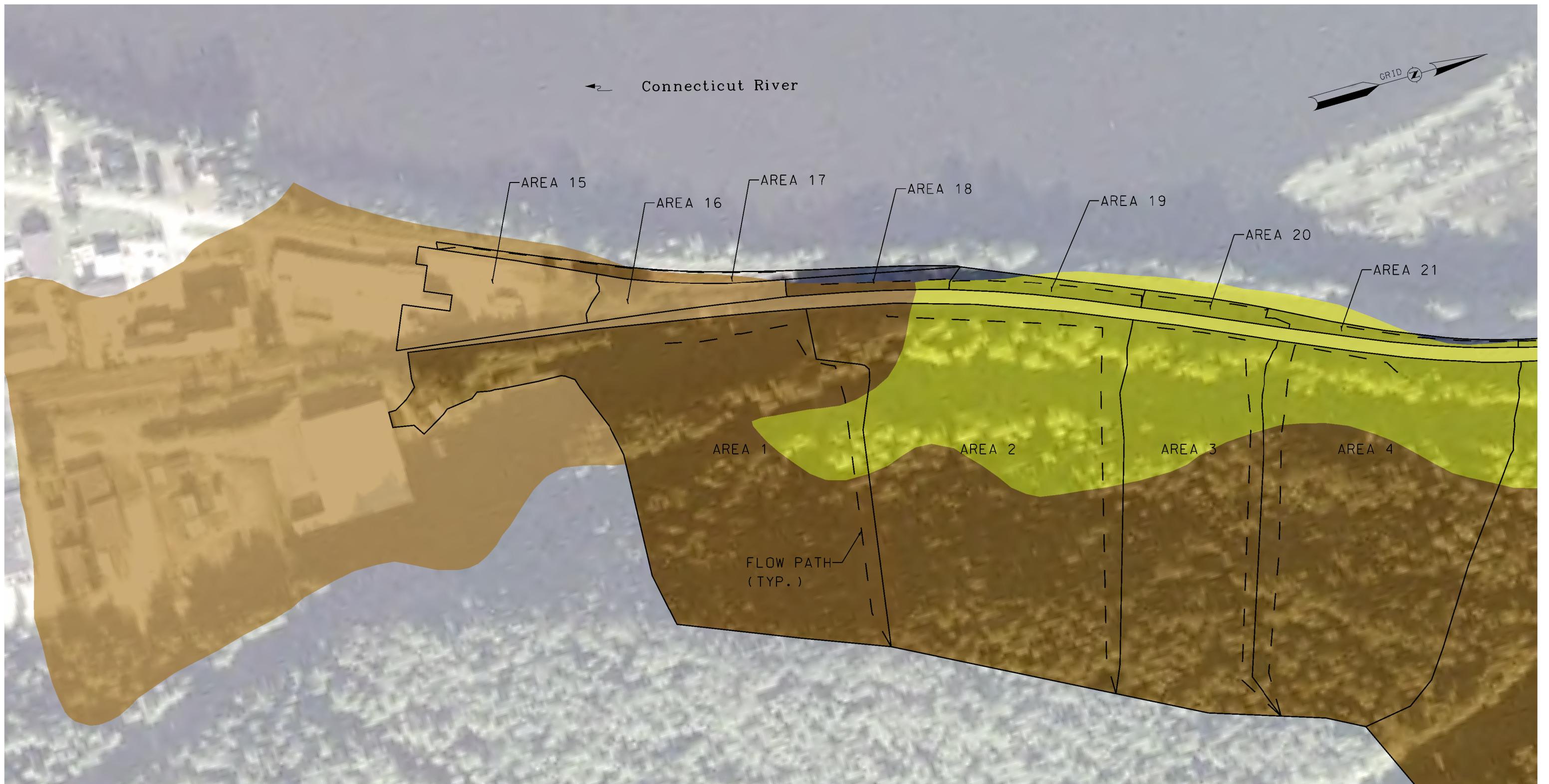
WALPOLE, NH

PLOT DATE: 1/22/2017

FILENAME: 14747watershedplans_Exist.dgn

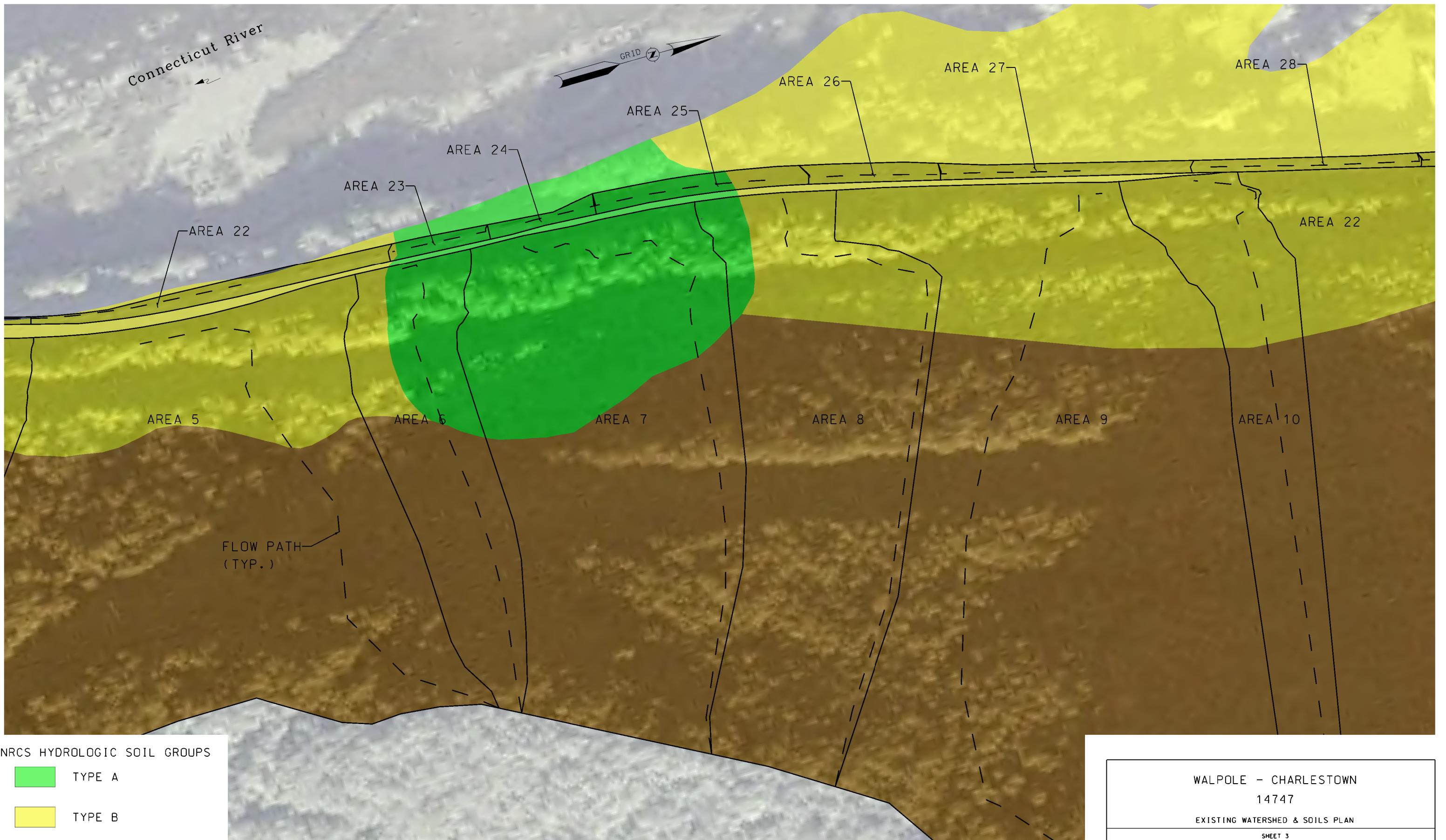
JACOBS

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BEDFORD, N.H. 03110
1.603.666.7181



100 0 100 200
SCALE IN FEET

WALPOLE - CHARLESTOWN 14747	
EXISTING WATERSHED & SOILS PLAN	
SHEET 2	
N.H. ROUTE 12 RECONSTRUCTION	
WALPOLE, NH	
PLOT DATE: 1/22/2017	FILENAME: 14747watershedplans_Exist.dwg
JACOBS TWO EXECUTIVE PARK DRIVE BEDFORD, N.H. 03110 1.603.666.7181	



NRCS HYDROLOGIC SOIL GROUPS

TYPE A

TYPE B

TYPE C

TYPE D

NOTE:
REFER TO SHEET 1 FOR LARGER AREAS
NOT COMPLETELY SHOWN ON THIS PLAN.

100 0 100 200
SCALE IN FEET

WALPOLE - CHARLESTOWN

14747

EXISTING WATERSHED & SOILS PLAN

SHEET 3

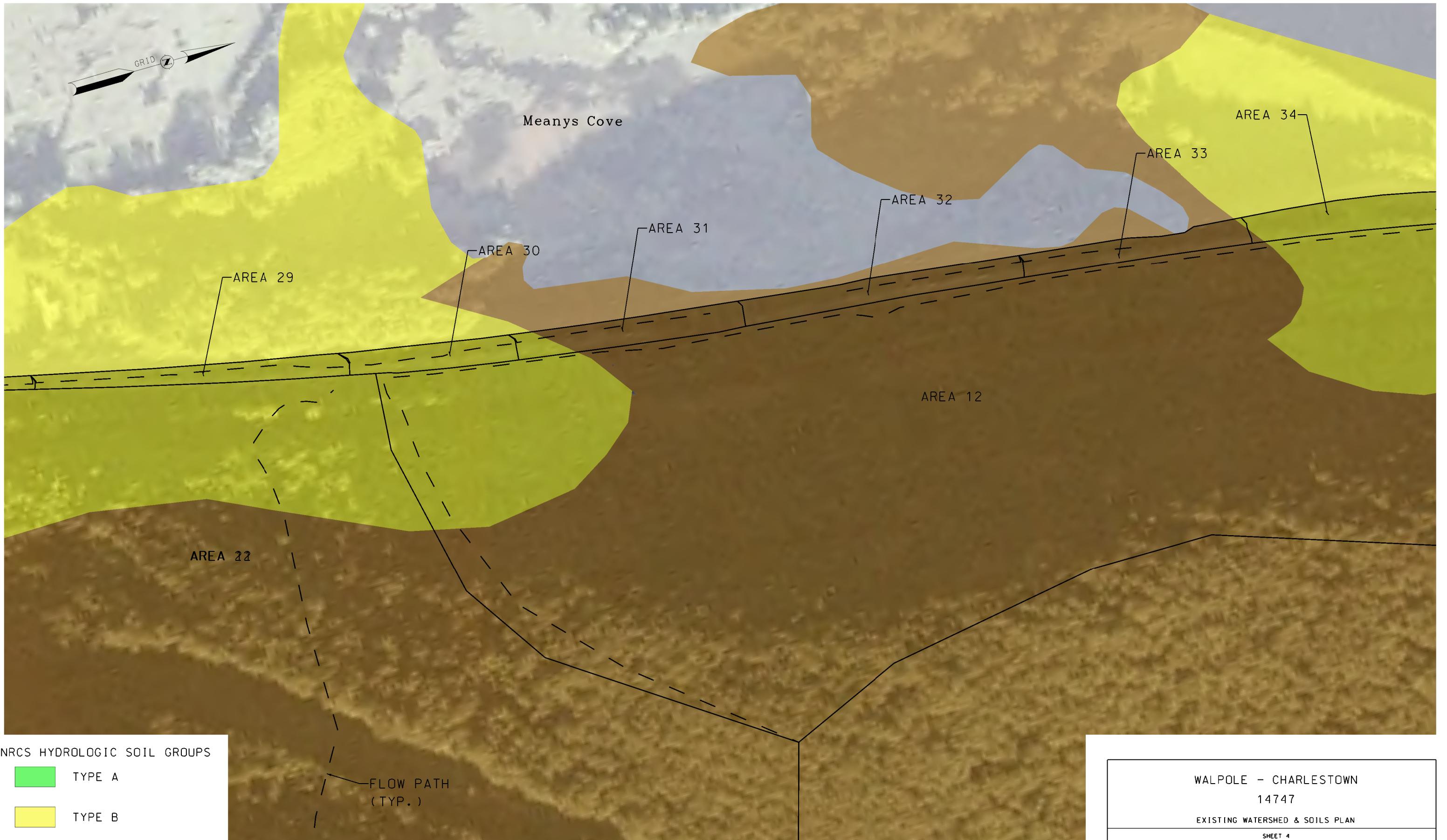
N.H. ROUTE 12 RECONSTRUCTION

WALPOLE, NH

PLOT DATE: 1/22/2017

FILENAME: 14747watershedplans_Exist.dwg

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1.603.666.7181



NRCS HYDROLOGIC SOIL GROUPS

TYPE A

TYPE B

TYPE C

TYPE D

NOTE:
REFER TO SHEET 1 FOR LARGER AREAS
NOT COMPLETELY SHOWN ON THIS PLAN.

100 0 100 200
SCALE IN FEET

WALPOLE - CHARLESTOWN
14747

EXISTING WATERSHED & SOILS PLAN

SHEET 4

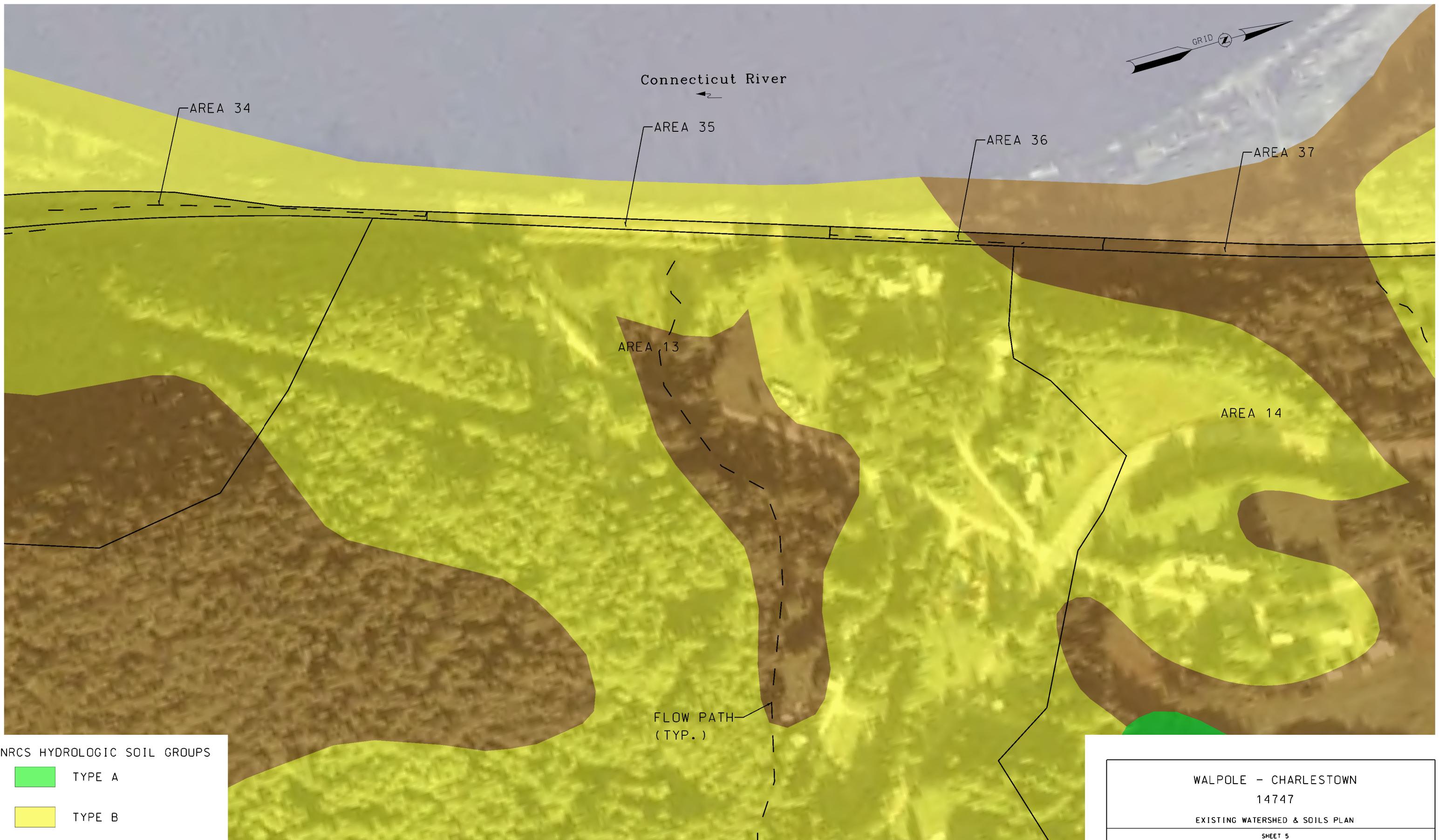
N.H. ROUTE 12 RECONSTRUCTION

WALPOLE, NH

PLOT DATE: 1/22/2017

FILENAME: 14747watershedplans_Exist.dwg

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NRCS HYDROLOGIC SOIL GROUPS

TYPE A

TYPE B

TYPE C

TYPE D

NOTE:
REFER TO SHEET 1 FOR LARGER AREAS
NOT COMPLETELY SHOWN ON THIS PLAN.

100 0 100 200
SCALE IN FEET

WALPOLE - CHARLESTOWN

14747

EXISTING WATERSHED & SOILS PLAN

SHEET 5

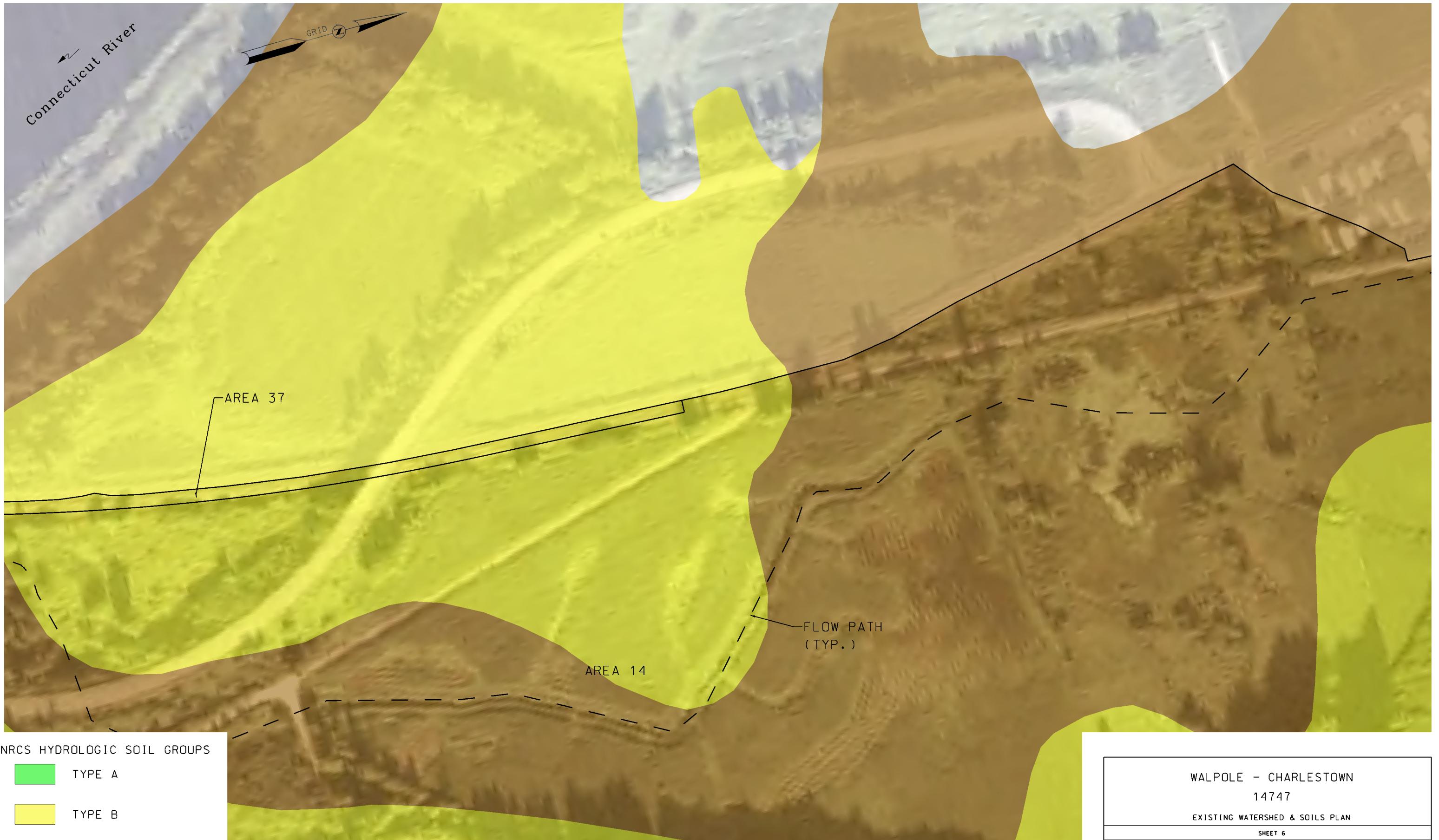
N.H. ROUTE 12 RECONSTRUCTION

WALPOLE, NH

PLOT DATE: 1/22/2017

FILENAME: 14747watershedplans_Exist.dwg

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WALPOLE - CHARLESTOWN	
14747	
EXISTING WATERSHED & SOILS PLAN	
SHEET 6	
N.H. ROUTE 12 RECONSTRUCTION	
WALPOLE, NH	
PLOT DATE: 1/22/2017	FILENAME: 14747watershedplans_Exist.dwg
JACOBS TWO EXECUTIVE PARK DRIVE BEDFORD, N.H. 03110 1.603.666.7181	

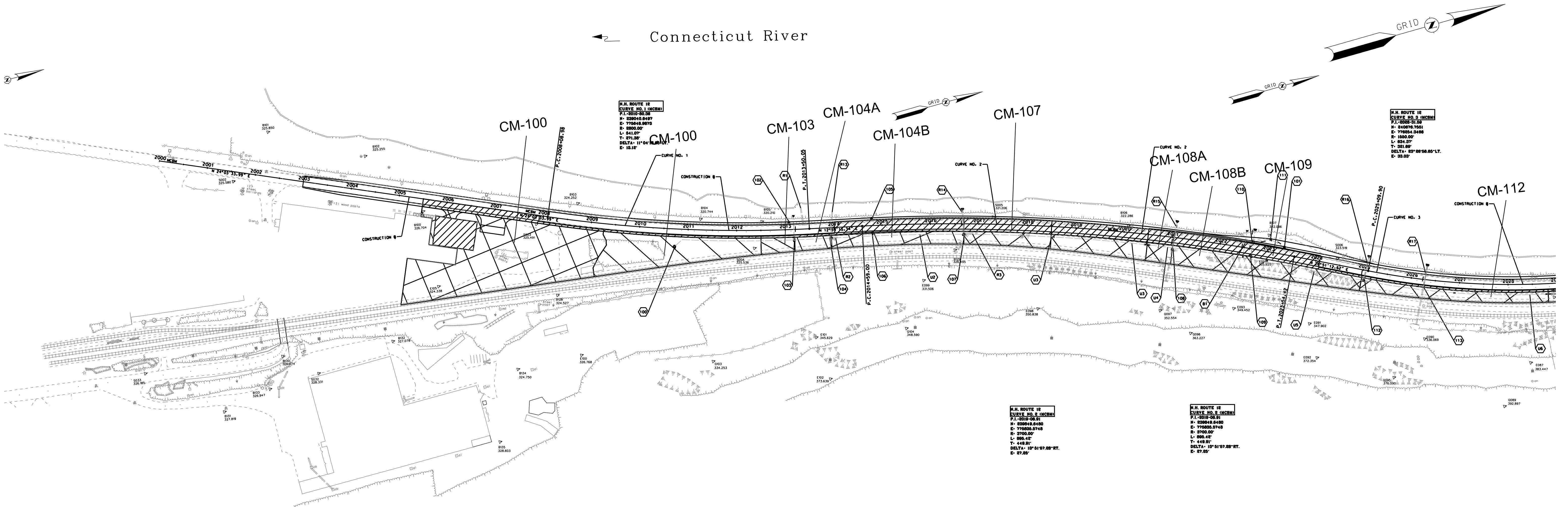
New Hampshire Department of Transportation
Walpole-Charlestown, X-A000(487),14747
N.H. Route 12 Reconstruction

POLLUTANT LOADING ANALYSIS REPORT

APPENDIX 4:

PROPOSED WATERSHED PLANS

Connecticut River



WALPOLE - CHARLESTOWN

14747

CONTRIBUTING AREAS - PROPOSED DRAINAGE

SHEET 1

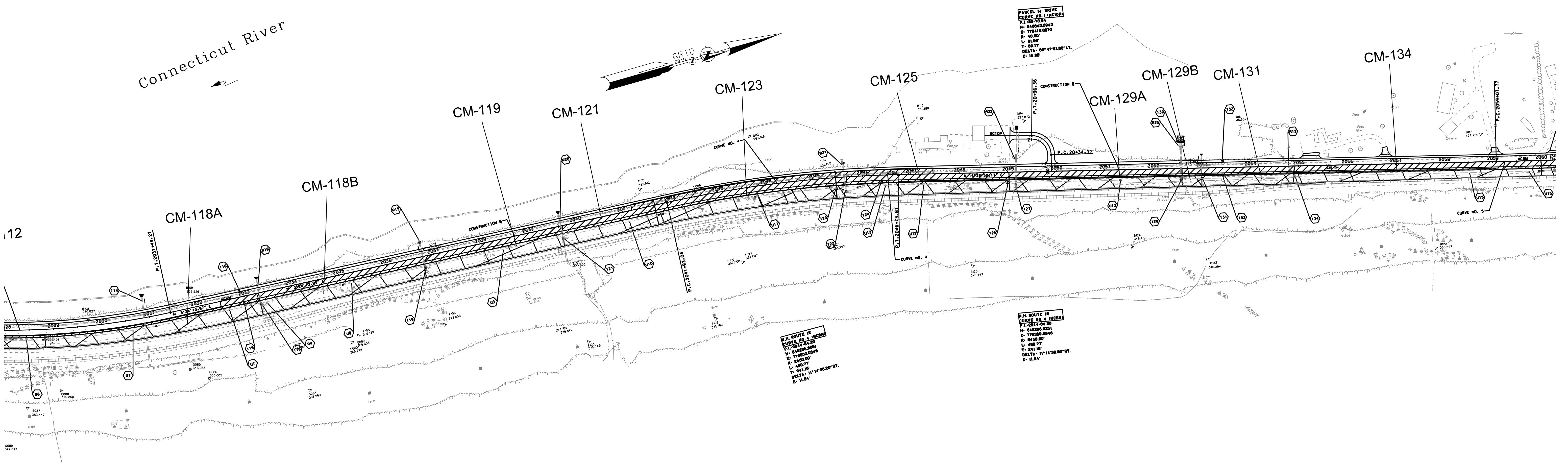
N.H. ROUTE 12 RECONSTRUCTION

WALPOLE, NH

PLOT DATE: 6/13/2017

FILENAME: 14747contributingareas_Prop.dgn

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1.603.666.7181



100 0 100 200

SCALE IN FEET

WALPOLE - CHARLESTOWN

14747

CONTRIBUTING AREAS - PROPOSED DRAINAGE

SHEET 2

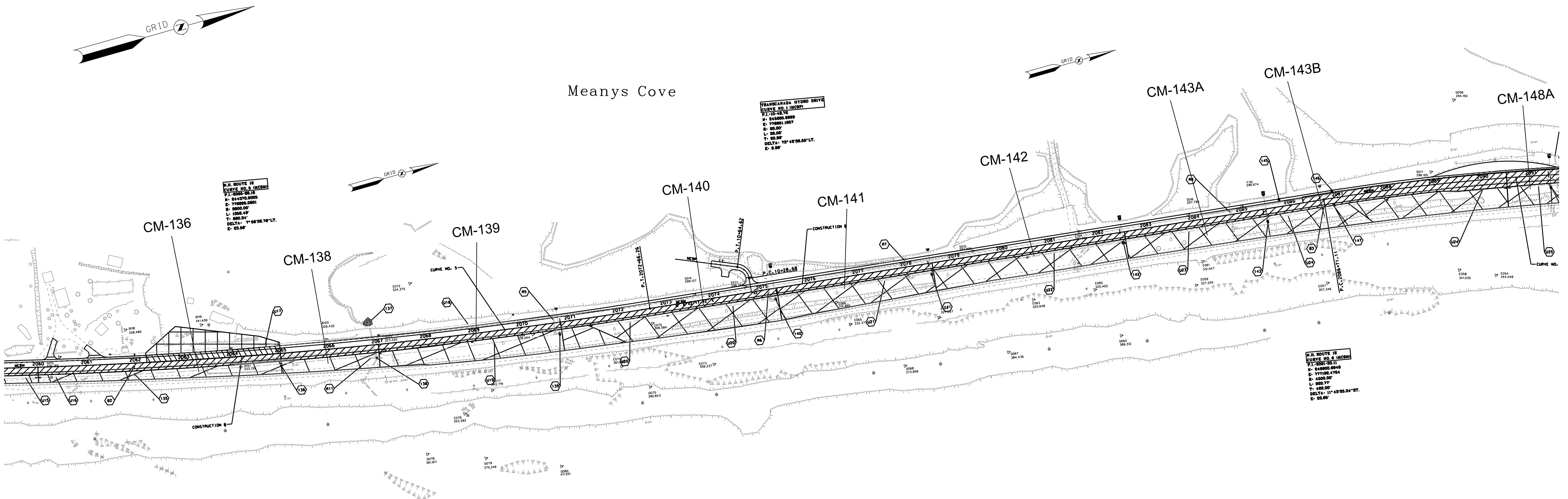
N.H. ROUTE 12 RECONSTRUCTION

WALPOLE, NH

PLOT DATE: 6/13/2017

FILENAME: 14747contributingareas_Prop.dgn

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1.603.666.7181



100 0 100 200
SCALE IN FEET

WALPOLE - CHARLESTOWN

14747

CONTRIBUTING AREAS - PROPOSED DRAINAGE

SHEET 3

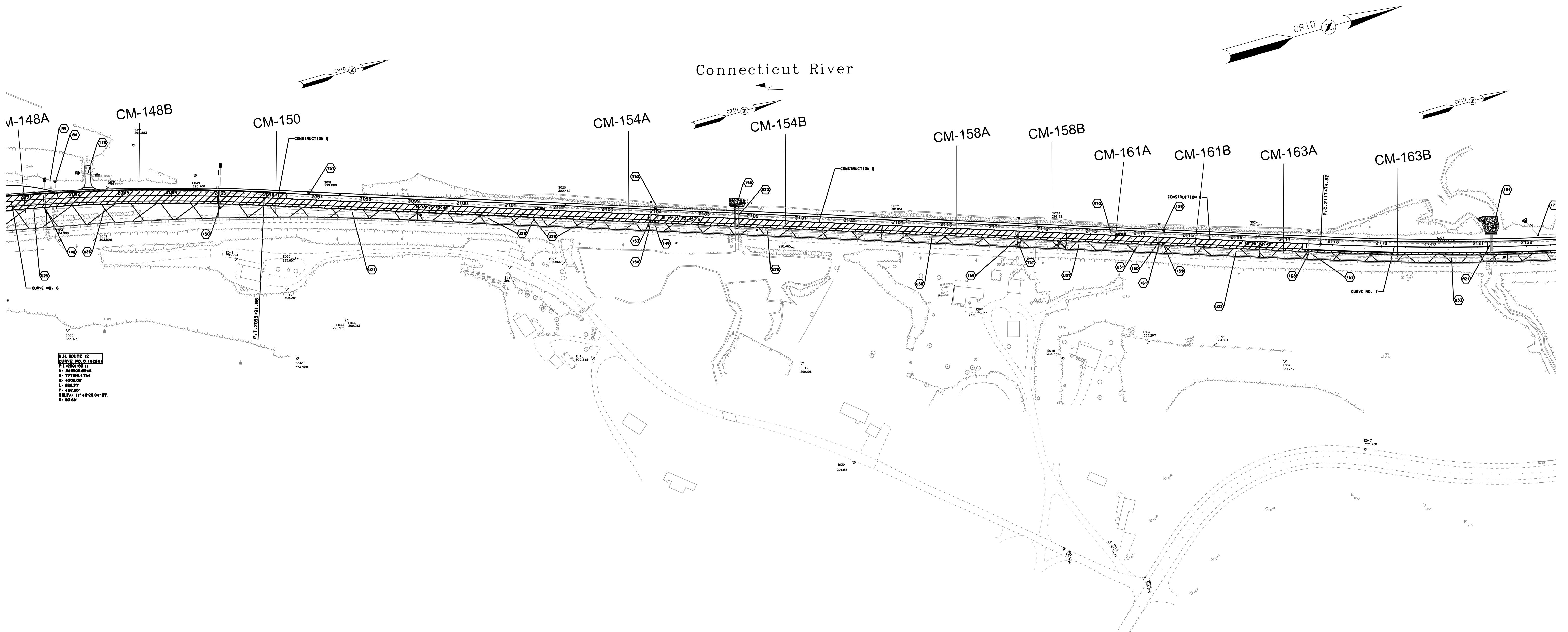
N.H. ROUTE 12 RECONSTRUCTION

WALPOLE, NH

PLOT DATE: 6/13/2017

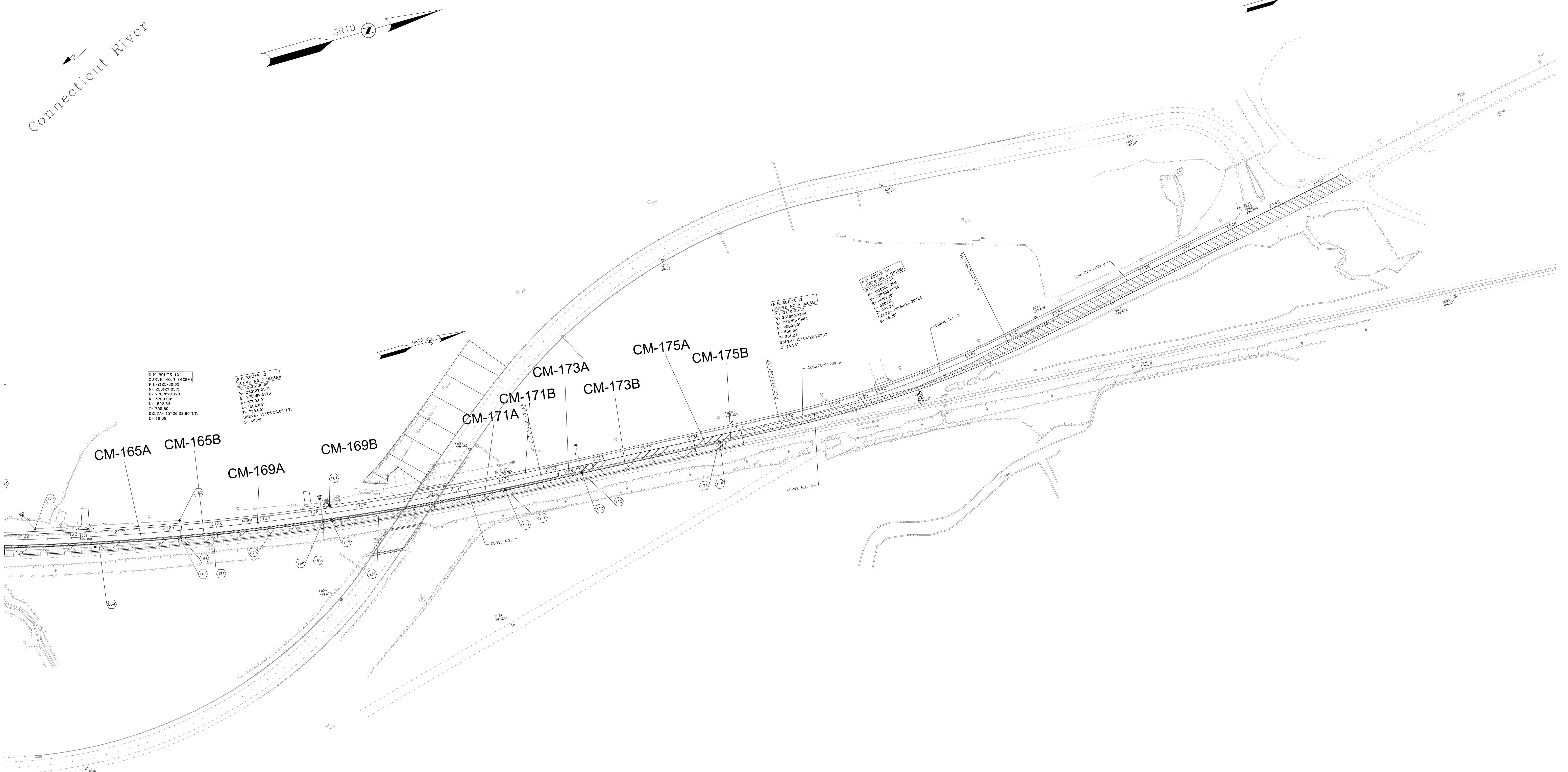
FILENAME: 14747contributingareas_Prop.dgn

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100 0 100 200
SCALE IN FEET

WALPOLE - CHARLESTOWN	
14747	
CONTRIBUTING AREAS - PROPOSED DRAINAGE	
SHEET 4	
N.H. ROUTE 12 RECONSTRUCTION	
WALPOLE, NH	
PLOT DATE: 6/13/2017	FILENAME: 14747contributingareas_Prop.dgn
JACOBS TWO EXECUTIVE PARK DRIVE BEDFORD, N.H. 03110 1.603.666.7181	



100 0 100 200
SCALE IN FEET

WALPOLE - CHARLESTOWN

14747

CONTRIBUTING AREAS - PROPOSED DRAINAGE

SHEET 5

N.H. ROUTE 12 RECONSTRUCTION

WALPOLE, NH

PLOT DATE: 6/13/2017

FILENAME: 14747contributingareaplan_Prop.dgn

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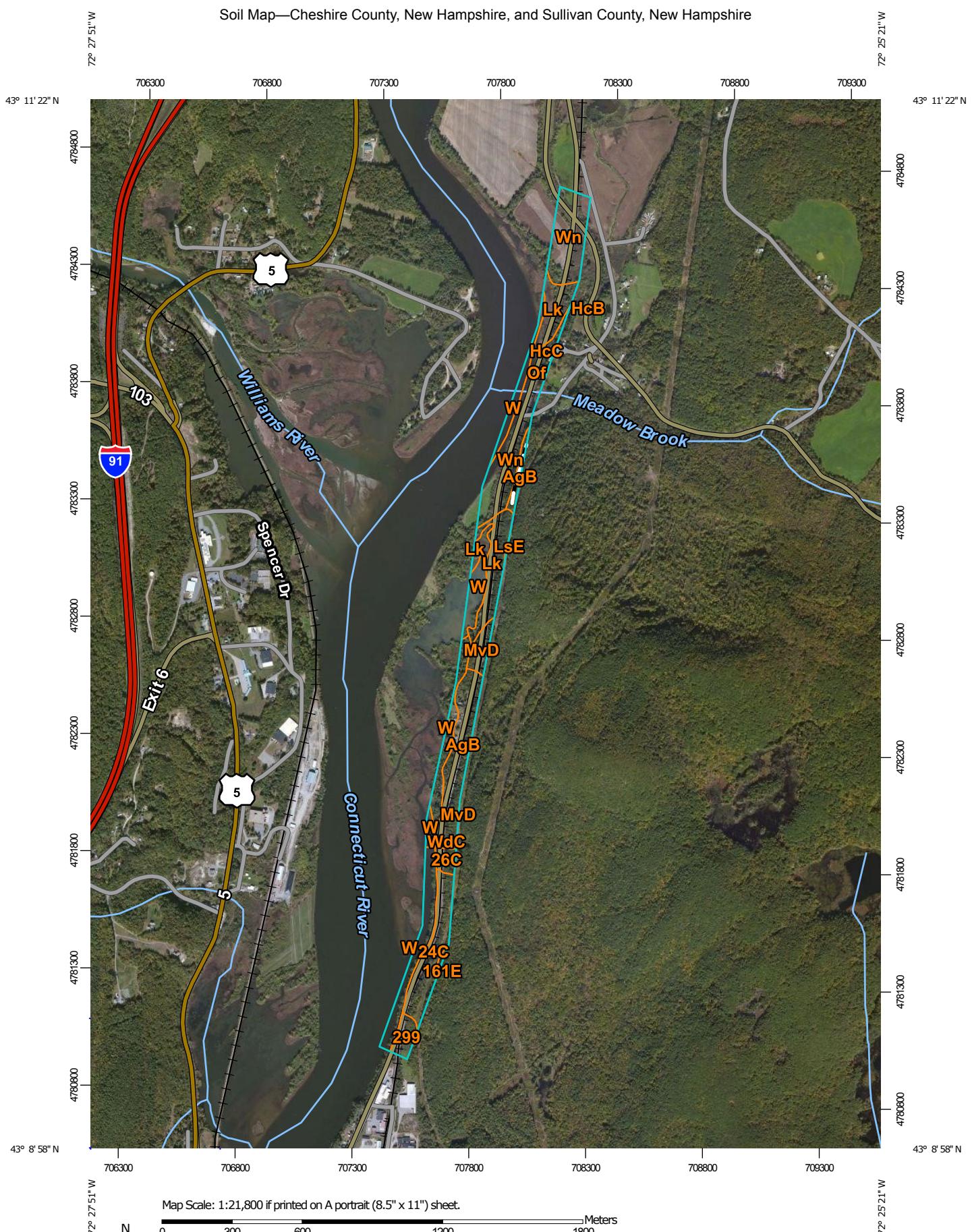
New Hampshire Department of Transportation
Walpole-Charlestown, X-A000(487),14747
N.H. Route 12 Reconstruction

POLLUTANT LOADING ANALYSIS REPORT

APPENDIX 5:

NRCS SOILS DATA

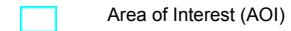
Soil Map—Cheshire County, New Hampshire, and Sullivan County, New Hampshire



Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

6/21/2017
Page 1 of 3

MAP LEGEND**Area of Interest (AOI)**

Area of Interest (AOI)

Soils

Soil Map Unit Polygons



Soil Map Unit Lines



Soil Map Unit Points

Special Point Features

Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



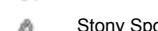
Sinkhole



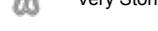
Slide or Slip



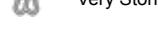
Sodic Spot

Spoil Area

Spoil Area

Stony Spot

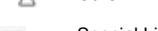
Stony Spot

Very Stony Spot

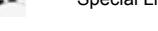
Very Stony Spot

Wet Spot

Wet Spot

Other

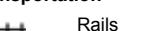
Other

Special Line Features

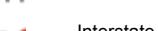
Special Line Features

Water Features

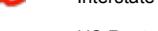
Streams and Canals

Transportation

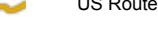
Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Cheshire County, New Hampshire

Survey Area Data: Version 19, Sep 15, 2016

Soil Survey Area: Sullivan County, New Hampshire

Survey Area Data: Version 21, Sep 15, 2016

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 10, 2011—Oct 8, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

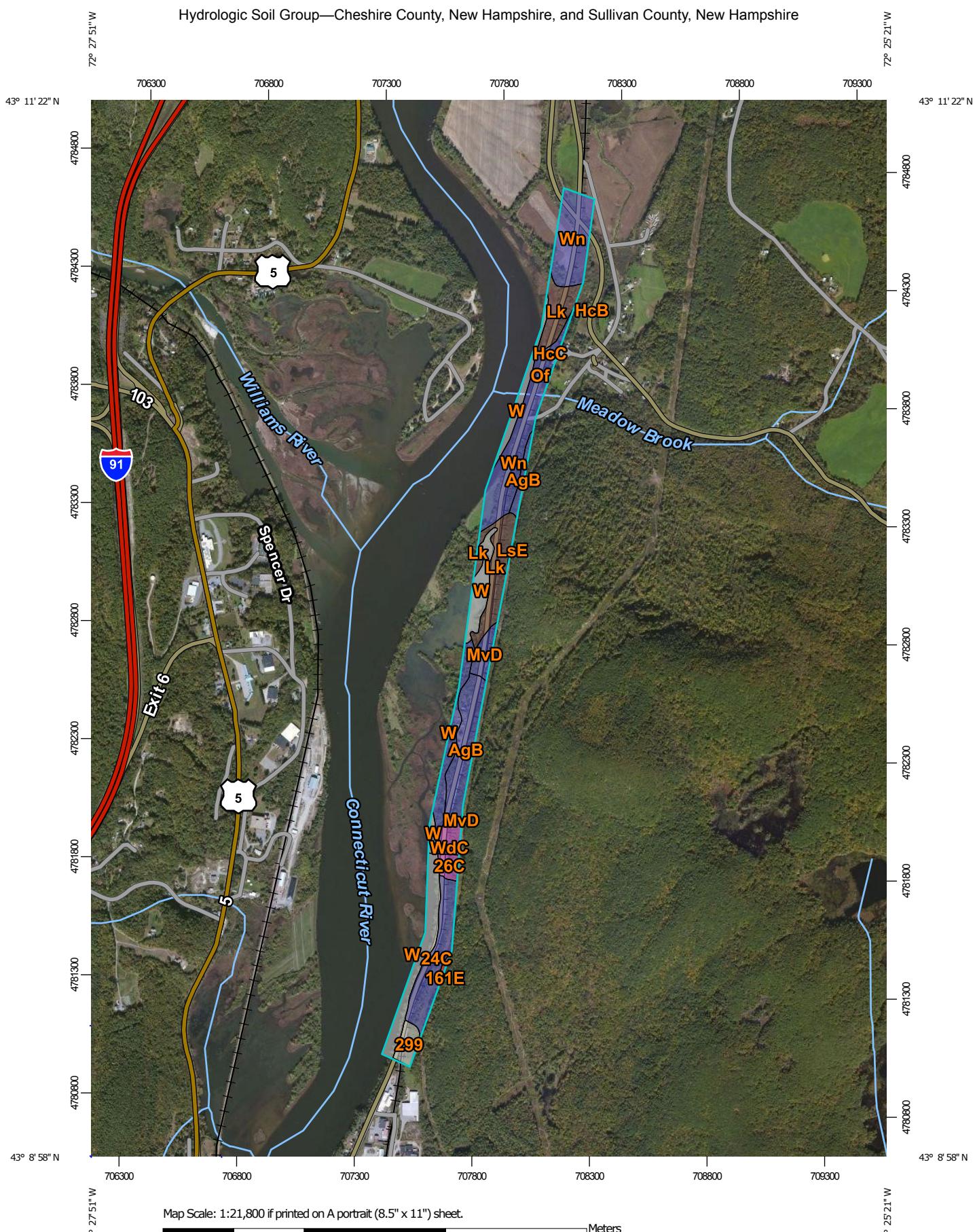


Map Unit Legend

Cheshire County, New Hampshire (NH005)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
24C	Agawam fine sandy loam, 8 to 15 percent slopes	12.9	10.9%
26C	Windsor loamy sand, 8 to 15 percent slopes	2.1	1.8%
161E	Lyman-Tunbridge-Rock outcrop complex, 25 to 60 percent slopes	0.4	0.3%
299	Udorthents, smoothed	3.3	2.8%
W	Water	10.2	8.7%
Subtotals for Soil Survey Area		28.9	24.5%
Totals for Area of Interest		117.9	100.0%

Sullivan County, New Hampshire (NH019)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AgB	Agawam fine sandy loam, 3 to 8 percent slopes	14.9	12.6%
HcB	Haven very fine sandy loam, 3 to 8 percent slopes	0.0	0.0%
HcC	Haven very fine sandy loam, 8 to 15 percent slopes	2.9	2.5%
Lk	Limerick silt loam	17.3	14.7%
LsE	Lyman-Monadnock-Rock outcrop complex, 25 to 50 percent slopes, very stony	0.1	0.1%
MvD	Monadnock-Lyman stony fine sandy loams, 15 to 25 percent slopes	3.5	2.9%
Of	Ondawa fine sandy loam, 0 to 3 percent slopes, occasionally flooded	0.6	0.5%
W	Water	11.3	9.6%
WdC	Windsor loamy sand, 8 to 15 percent slopes	3.3	2.8%
Wn	Winooski silt loam	35.2	29.9%
Subtotals for Soil Survey Area		89.0	75.5%
Totals for Area of Interest		117.9	100.0%

Hydrologic Soil Group—Cheshire County, New Hampshire, and Sullivan County, New Hampshire



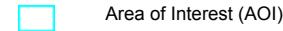
Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

6/21/2017
Page 1 of 4

MAP LEGEND

Area of Interest (AOI)



Soils

Soil Rating Polygons

	A
	A/D
	B
	B/D
	C
	C/D
	D
	Not rated or not available

Soil Rating Lines

	A
	A/D
	B
	B/D
	C
	C/D
	D
	Not rated or not available

Soil Rating Points

	A
	A/D
	B
	B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Cheshire County, New Hampshire

Survey Area Data: Version 19, Sep 15, 2016

Soil Survey Area: Sullivan County, New Hampshire

Survey Area Data: Version 21, Sep 15, 2016

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 10, 2011—Oct 8, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.



Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Cheshire County, New Hampshire (NH005)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
24C	Agawam fine sandy loam, 8 to 15 percent slopes	B	12.9	10.9%
26C	Windsor loamy sand, 8 to 15 percent slopes	A	2.1	1.8%
161E	Lyman-Tunbridge-Rock outcrop complex, 25 to 60 percent slopes	D	0.4	0.3%
299	Udorthents, smoothed		3.3	2.8%
W	Water		10.2	8.7%
Subtotals for Soil Survey Area			28.9	24.5%
Totals for Area of Interest			117.9	100.0%

Hydrologic Soil Group— Summary by Map Unit — Sullivan County, New Hampshire (NH019)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
AgB	Agawam fine sandy loam, 3 to 8 percent slopes	B	14.9	12.6%
HcB	Haven very fine sandy loam, 3 to 8 percent slopes	B	0.0	0.0%
HcC	Haven very fine sandy loam, 8 to 15 percent slopes	B	2.9	2.5%
Lk	Limerick silt loam	B/D	17.3	14.7%
LsE	Lyman-Monadnock-Rock outcrop complex, 25 to 50 percent slopes, very stony	D	0.1	0.1%
MvD	Monadnock-Lyman stony fine sandy loams, 15 to 25 percent slopes	B	3.5	2.9%
Of	Ondawa fine sandy loam, 0 to 3 percent slopes, occasionally flooded	B	0.6	0.5%
W	Water		11.3	9.6%
WdC	Windsor loamy sand, 8 to 15 percent slopes	A	3.3	2.8%
Wn	Winooski silt loam	B	35.2	29.9%
Subtotals for Soil Survey Area			89.0	75.5%



Hydrologic Soil Group— Summary by Map Unit — Sullivan County, New Hampshire (NH019)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Totals for Area of Interest			117.9	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



New Hampshire Department of Transportation
Walpole-Charlestown, X-A000(487),14747
N.H. Route 12 Reconstruction

POLLUTANT LOADING ANALYSIS REPORT

APPENDIX 6:

**INFILTRATION PRACTICE DESIGN CRITERIA
(NHDES WORKSHEETS)**

HYDROCAD STAGE-STORAGE TABLES FOR INFILTRATION BMPS

INFILTRATION PRACTICE DESIGN CRITERIA (Env-Wq 1508.05)

Type/Node Name: **Infiltration BMP #1A (Sta. 2012+25 to Sta. 2020+50)**

Enter the type of infiltration practice (e.g., trench) and the node name in the drainage analysis, if applicable

Yes	Have you reviewed Env-Wq 1508.05(a) to ensure that infiltration is allowed?	
0.76 ac	A = Area draining to the practice	
0.61 ac	A_I = Impervious area draining to the practice	
0.80 decimal	I = percent impervious area draining to the practice, in decimal form	
0.77 unitless	$Rv = \text{Runoff coefficient} = 0.05 + (0.9 \times I)$	
0.59 ac-in	$WQV = 1'' \times Rv \times A$	
2,131 cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
533 cf	25% x WQV (check calc for sediment forebay volume)	
<u>None</u>	Method of pretreatment? (not required for clean or roof runoff)	
- cf	V_{SED} = sediment forebay volume, if used for pretreatment	$\leftarrow \geq 25\% WQV$
2,475 cf	V = volume ¹ (attach a stage-storage table)	$\leftarrow \geq WQV$
33,000 sf	A_{SA} = surface area of the bottom of the pond	
5.60 iph	I_{DESIGN} = design infiltration rate ²	
0.2 hours	$T_{DRAIN} = V / (A_{SA} * I_{DESIGN})$	$\leftarrow \leq 72\text{-hrs}$
316.60 feet	E_{BTM} = elevation of the bottom of the practice	
291.00 feet	E_{SHWT} = elevation of SHWT (if none found, enter the lowest elevation of the test pit)	
260.00 feet	E_{ROCK} = elevation of bedrock (if none found, enter the lowest elevation of the test pit)	
25.60 feet	D_{SHWT} = separation from SHWT ³	$\leftarrow \geq *^3$
56.6 feet	D_{ROCK} = separation from bedrock ³	$\leftarrow \geq *^3$
ft	D_T = depth of trench, if trench proposed	$\leftarrow 4 - 10\text{ ft}$
No Yes/No	If a trench or underground system is proposed, observation well provided	
Stone	If a trench is proposed, material in trench	
N/A	If a basin is proposed, basin floor material	
N/A Yes/No	If a basin is proposed, the perimeter should be curvilinear.	
N/A :1	If a basin is proposed, pond side slopes	$\leftarrow \geq 3:1$
317.17 ft	Peak elevation of the 10-year storm event (infiltration can be used in analysis)	
317.36 ft	Peak elevation of the 50-year storm event (infiltration can be used in analysis)	
318.10 ft	Elevation of the top of the practice (if a basin, this is the elevation of the berm)	
YES	10 peak elevation \leq Elevation of the top of the trench?	\leftarrow yes
YES	If a basin is proposed, 50-year peak elevation \leq Elevation of berm?	\leftarrow yes

1. Volume below the lowest invert of the outlet structure and excludes forebay volume
2. See NH Stormwater Manual, Vol.2, Ch.2-4, for guidance on determining the infiltration rate
3. 1' separation if treatment not required; 4' for treatment in GPAs & WSIPAs; & 3' in all other areas.

Designer's Notes:

Peak elevations for the 10 year and 50 year storm events assume infiltration is no longer occurring and stormwater within the BMP is flowing to the transverse drains at the low points.

Infiltration rates were determined from NRCS Ksat values for the soil type.

Bedrock elevation is below the cross section grid. The lowest elevation on the grid was entered.

SHWT elevation represents OHW of the Connecticut River. There is no nearby subsurface data.

INFILTRATION PRACTICE DESIGN CRITERIA (Env-Wq 1508.05)

Type/Node Name: **Infiltration BMP #1B (Sta. 2020+50 to Sta. 2022+56)**

Enter the type of infiltration practice (e.g., trench) and the node name in the drainage analysis, if applicable

Yes	Have you reviewed Env-Wq 1508.05(a) to ensure that infiltration is allowed?	
0.20 ac	A = Area draining to the practice	
0.16 ac	A_I = Impervious area draining to the practice	
0.80 decimal	I = percent impervious area draining to the practice, in decimal form	
0.77 unitless	$Rv = \text{Runoff coefficient} = 0.05 + (0.9 \times I)$	
0.15 ac-in	$WQV = 1'' \times Rv \times A$	
559 cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
140 cf	25% x WQV (check calc for sediment forebay volume)	
<u>None</u>	Method of pretreatment? (not required for clean or roof runoff)	
- cf	V_{SED} = sediment forebay volume, if used for pretreatment	$\leftarrow \geq 25\% WQV$
641 cf	V = volume ¹ (attach a stage-storage table)	$\leftarrow \geq WQV$
8,538 sf	A_{SA} = surface area of the bottom of the pond	
5.60 iph	I_{DESIGN} = design infiltration rate ²	
0.2 hours	$T_{DRAIN} = V / (A_{SA} * I_{DESIGN})$	$\leftarrow \leq 72\text{-hrs}$
319.02 feet	E_{BTM} = elevation of the bottom of the practice	
314.90 feet	E_{SHWT} = elevation of SHWT (if none found, enter the lowest elevation of the test pit)	
314.40 feet	E_{ROCK} = elevation of bedrock (if none found, enter the lowest elevation of the test pit)	
4.12 feet	D_{SHWT} = separation from SHWT ³	$\leftarrow \geq *^3$
4.6 feet	D_{ROCK} = separation from bedrock ³	$\leftarrow \geq *^3$
ft	D_T = depth of trench, if trench proposed	$\leftarrow 4 - 10\text{ ft}$
No Yes/No	If a trench or underground system is proposed, observation well provided	
Stone	If a trench is proposed, material in trench	
N/A	If a basin is proposed, basin floor material	
N/A Yes/No	If a basin is proposed, the perimeter should be curvilinear.	
N/A :1	If a basin is proposed, pond side slopes	$\leftarrow \geq 3:1$
319.52 ft	Peak elevation of the 10-year storm event (infiltration can be used in analysis)	
319.53 ft	Peak elevation of the 50-year storm event (infiltration can be used in analysis)	
320.52 ft	Elevation of the top of the practice (if a basin, this is the elevation of the berm)	
YES	10 peak elevation \leq Elevation of the top of the trench?	\leftarrow yes
YES	If a basin is proposed, 50-year peak elevation \leq Elevation of berm?	\leftarrow yes

1. Volume below the lowest invert of the outlet structure and excludes forebay volume
2. See NH Stormwater Manual, Vol.2, Ch.2-4, for guidance on determining the infiltration rate
3. 1' separation if treatment not required; 4' for treatment in GPAs & WSIPAs; & 3' in all other areas.

Designer's Notes:

Peak elevations for the 10 year and 50 year storm events assume infiltration is no longer occurring and stormwater within the BMP is flowing to the transverse drains at the low points.

Infiltration rates were determined from NRCS Ksat values for the soil type.

Bedrock elevation was determined from ledge lines on cross sections.

SHWT elevation was determined from nearest boring.

INFILTRATION PRACTICE DESIGN CRITERIA (Env-Wq 1508.05)

Type/Node Name: **Infiltration BMP #2A (Sta. 2025+03 to Sta. 2028+82)**

Enter the type of infiltration practice (e.g., trench) and the node name in the drainage analysis, if applicable

Yes	Have you reviewed Env-Wq 1508.05(a) to ensure that infiltration is allowed?	
0.35 ac	A = Area draining to the practice	
0.28 ac	A_I = Impervious area draining to the practice	
0.80 decimal	I = percent impervious area draining to the practice, in decimal form	
0.77 unitless	$Rv = \text{Runoff coefficient} = 0.05 + (0.9 \times I)$	
0.27 ac-in	$WQV = 1'' \times Rv \times A$	
978 cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
245 cf	25% x WQV (check calc for sediment forebay volume)	
<u>None</u>	Method of pretreatment? (not required for clean or roof runoff)	
- cf	V_{SED} = sediment forebay volume, if used for pretreatment	$\leftarrow \geq 25\%WQV$
1,145 cf	V = volume ¹ (attach a stage-storage table)	$\leftarrow \geq WQV$
15,259 sf	A_{SA} = surface area of the bottom of the pond	
5.60 iph	I_{DESIGN} = design infiltration rate ²	
0.2 hours	$T_{DRAIN} = V / (A_{SA} * I_{DESIGN})$	$\leftarrow \leq 72\text{-hrs}$
320.52 feet	E_{BTM} = elevation of the bottom of the practice	
302.70 feet	E_{SHWT} = elevation of SHWT (if none found, enter the lowest elevation of the test pit)	
302.70 feet	E_{ROCK} = elevation of bedrock (if none found, enter the lowest elevation of the test pit)	
17.82 feet	D_{SHWT} = separation from SHWT ³	$\leftarrow \geq *^3$
17.8 feet	D_{ROCK} = separation from bedrock ³	$\leftarrow \geq *^3$
ft	D_T = depth of trench, if trench proposed	$\leftarrow 4 - 10\text{ ft}$
No Yes/No	If a trench or underground system is proposed, observation well provided	
Stone	If a trench is proposed, material in trench	
N/A	If a basin is proposed, basin floor material	
N/A Yes/No	If a basin is proposed, the perimeter should be curvilinear.	
N/A :1	If a basin is proposed, pond side slopes	$\leftarrow \geq 3:1$
321.10 ft	Peak elevation of the 10-year storm event (infiltration can be used in analysis)	
321.31 ft	Peak elevation of the 50-year storm event (infiltration can be used in analysis)	
322.02 ft	Elevation of the top of the practice (if a basin, this is the elevation of the berm)	
YES	10 peak elevation \leq Elevation of the top of the trench?	\leftarrow yes
YES	If a basin is proposed, 50-year peak elevation \leq Elevation of berm?	\leftarrow yes

- Volume below the lowest invert of the outlet structure and excludes forebay volume
- See NH Stormwater Manual, Vol.2, Ch.2-4, for guidance on determining the infiltration rate
- 1' separation if treatment not required; 4' for treatment in GPAs & WSIPAs; & 3' in all other areas.

Designer's Notes:

Peak elevations for the 10 year and 50 year storm events assume infiltration is no longer occurring and stormwater within the BMP is flowing to the transverse drains at the low points.

Infiltration rates were determined from NRCS Ksat values for the soil type.

Bedrock elevation was determined from ledge lines on cross sections.

SHWT elevation is assumed to be at ledge elevation.

INFILTRATION PRACTICE DESIGN CRITERIA (Env-Wq 1508.05)

Type/Node Name: **Infiltration BMP #2B (Sta. 2028+82 to Sta. 2039+00)**

Enter the type of infiltration practice (e.g., trench) and the node name in the drainage analysis, if applicable

Yes	Have you reviewed Env-Wq 1508.05(a) to ensure that infiltration is allowed?	
0.93 ac	A = Area draining to the practice	
0.75 ac	A_I = Impervious area draining to the practice	
0.81 decimal	I = percent impervious area draining to the practice, in decimal form	
0.78 unitless	$Rv = \text{Runoff coefficient} = 0.05 + (0.9 \times I)$	
0.72 ac-in	$WQV = 1'' \times Rv \times A$	
2,619 cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
655 cf	25% x WQV (check calc for sediment forebay volume)	
<u>None</u>	Method of pretreatment? (not required for clean or roof runoff)	
- cf	V_{SED} = sediment forebay volume, if used for pretreatment	$\leftarrow \geq 25\% WQV$
3,054 cf	V = volume ¹ (attach a stage-storage table)	$\leftarrow \geq WQV$
40,720 sf	A_{SA} = surface area of the bottom of the pond	
5.60 iph	I_{DESIGN} = design infiltration rate ²	
0.2 hours	$T_{DRAIN} = V / (A_{SA} * I_{DESIGN})$	$\leftarrow \leq 72\text{-hrs}$
321.20 feet	E_{BTM} = elevation of the bottom of the practice	
310.30 feet	E_{SHWT} = elevation of SHWT (if none found, enter the lowest elevation of the test pit)	
288.70 feet	E_{ROCK} = elevation of bedrock (if none found, enter the lowest elevation of the test pit)	
10.90 feet	D_{SHWT} = separation from SHWT ³	$\leftarrow \geq *^3$
32.5 feet	D_{ROCK} = separation from bedrock ³	$\leftarrow \geq *^3$
ft	D_T = depth of trench, if trench proposed	$\leftarrow 4 - 10\text{ ft}$
No Yes/No	If a trench or underground system is proposed, observation well provided	
Stone	If a trench is proposed, material in trench	
N/A	If a basin is proposed, basin floor material	
N/A Yes/No	If a basin is proposed, the perimeter should be curvilinear.	
N/A :1	If a basin is proposed, pond side slopes	$\leftarrow \geq 3:1$
321.92 ft	Peak elevation of the 10-year storm event (infiltration can be used in analysis)	
322.24 ft	Peak elevation of the 50-year storm event (infiltration can be used in analysis)	
322.70 ft	Elevation of the top of the practice (if a basin, this is the elevation of the berm)	
YES	10 peak elevation \leq Elevation of the top of the trench?	\leftarrow yes
YES	If a basin is proposed, 50-year peak elevation \leq Elevation of berm?	\leftarrow yes

- Volume below the lowest invert of the outlet structure and excludes forebay volume
- See NH Stormwater Manual, Vol.2, Ch.2-4, for guidance on determining the infiltration rate
- 1' separation if treatment not required; 4' for treatment in GPAs & WSIPAs; & 3' in all other areas.

Designer's Notes:

Peak elevations for the 10 year and 50 year storm events assume infiltration is no longer occurring and stormwater within the BMP is flowing to the transverse drains at the low points.

Infiltration rates were determined from NRCS Ksat values for the soil type.

Bedrock elevation was determined from ledge lines on cross sections.

SHWT elevation was determined from nearest boring.

INFILTRATION PRACTICE DESIGN CRITERIA (Env-Wq 1508.05)

Type/Node Name: **Infiltration BMP #3A (Sta. 2049+00 to Sta. 2060+49)**

Enter the type of infiltration practice (e.g., trench) and the node name in the drainage analysis, if applicable

Yes	Have you reviewed Env-Wq 1508.05(a) to ensure that infiltration is allowed?	
1.04 ac	A = Area draining to the practice	
0.83 ac	A_I = Impervious area draining to the practice	
0.80 decimal	I = percent impervious area draining to the practice, in decimal form	
0.77 unitless	$Rv = \text{Runoff coefficient} = 0.05 + (0.9 \times I)$	
0.80 ac-in	$WQV = 1'' \times Rv \times A$	
2,900 cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
725 cf	25% x WQV (check calc for sediment forebay volume)	
<u>None</u>	Method of pretreatment? (not required for clean or roof runoff)	
- cf	V_{SED} = sediment forebay volume, if used for pretreatment	$\leftarrow \geq 25\% WQV$
3,408 cf	V = volume ¹ (attach a stage-storage table)	$\leftarrow \geq WQV$
45,436 sf	A_{SA} = surface area of the bottom of the pond	
5.60 iph	I_{DESIGN} = design infiltration rate ²	
0.2 hours	$T_{DRAIN} = V / (A_{SA} * I_{DESIGN})$	$\leftarrow \leq 72\text{-hrs}$
323.81 feet	E_{BTM} = elevation of the bottom of the practice	
308.20 feet	E_{SHWT} = elevation of SHWT (if none found, enter the lowest elevation of the test pit)	
308.20 feet	E_{ROCK} = elevation of bedrock (if none found, enter the lowest elevation of the test pit)	
15.61 feet	D_{SHWT} = separation from SHWT ³	$\leftarrow \geq *^3$
15.6 feet	D_{ROCK} = separation from bedrock ³	$\leftarrow \geq *^3$
ft	D_T = depth of trench, if trench proposed	$\leftarrow 4 - 10\text{ ft}$
No Yes/No	If a trench or underground system is proposed, observation well provided	
Stone	If a trench is proposed, material in trench	
N/A	If a basin is proposed, basin floor material	
N/A Yes/No	If a basin is proposed, the perimeter should be curvilinear.	
N/A :1	If a basin is proposed, pond side slopes	$\leftarrow \geq 3:1$
324.48 ft	Peak elevation of the 10-year storm event (infiltration can be used in analysis)	
324.73 ft	Peak elevation of the 50-year storm event (infiltration can be used in analysis)	
325.31 ft	Elevation of the top of the practice (if a basin, this is the elevation of the berm)	
YES	10 peak elevation \leq Elevation of the top of the trench?	\leftarrow yes
YES	If a basin is proposed, 50-year peak elevation \leq Elevation of berm?	\leftarrow yes

- Volume below the lowest invert of the outlet structure and excludes forebay volume
- See NH Stormwater Manual, Vol.2, Ch.2-4, for guidance on determining the infiltration rate
- 1' separation if treatment not required; 4' for treatment in GPAs & WSIPAs; & 3' in all other areas.

Designer's Notes:

Peak elevations for the 10 year and 50 year storm events assume infiltration is no longer occurring and stormwater within the BMP is flowing to the transverse drains at the low points.

Infiltration rates were determined from NRCS Ksat values for the soil type.

Bedrock elevation was determined from ledge lines on cross sections.

SHWT elevation is assumed to be at ledge elevation.

INFILTRATION PRACTICE DESIGN CRITERIA (Env-Wq 1508.05)

Type/Node Name: **Infiltration BMP #3B (Sta. 2060+49 to Sta. 2062+00)**

Enter the type of infiltration practice (e.g., trench) and the node name in the drainage analysis, if applicable

Yes	Have you reviewed Env-Wq 1508.05(a) to ensure that infiltration is allowed?	
0.14 ac	A = Area draining to the practice	
0.11 ac	A_I = Impervious area draining to the practice	
0.79 decimal	I = percent impervious area draining to the practice, in decimal form	
0.76 unitless	$Rv = \text{Runoff coefficient} = 0.05 + (0.9 \times I)$	
0.11 ac-in	$WQV = 1'' \times Rv \times A$	
385 cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
96 cf	25% x WQV (check calc for sediment forebay volume)	
<u>None</u>	Method of pretreatment? (not required for clean or roof runoff)	
- cf	V_{SED} = sediment forebay volume, if used for pretreatment	$\leftarrow \geq 25\% WQV$
442 cf	V = volume ¹ (attach a stage-storage table)	$\leftarrow \geq WQV$
5,889 sf	A_{SA} = surface area of the bottom of the pond	
5.60 iph	I_{DESIGN} = design infiltration rate ²	
0.2 hours	$T_{DRAIN} = V / (A_{SA} * I_{DESIGN})$	$\leftarrow \leq 72\text{-hrs}$
326.73 feet	E_{BTM} = elevation of the bottom of the practice	
316.70 feet	E_{SHWT} = elevation of SHWT (if none found, enter the lowest elevation of the test pit)	
316.70 feet	E_{ROCK} = elevation of bedrock (if none found, enter the lowest elevation of the test pit)	
10.03 feet	D_{SHWT} = separation from SHWT ³	$\leftarrow \geq *^3$
10.0 feet	D_{ROCK} = separation from bedrock ³	$\leftarrow \geq *^3$
ft	D_T = depth of trench, if trench proposed	$\leftarrow 4 - 10\text{ ft}$
No Yes/No	If a trench or underground system is proposed, observation well provided	
Stone	If a trench is proposed, material in trench	
N/A	If a basin is proposed, basin floor material	
N/A Yes/No	If a basin is proposed, the perimeter should be curvilinear.	
N/A :1	If a basin is proposed, pond side slopes	$\leftarrow \geq 3:1$
326.72 ft	Peak elevation of the 10-year storm event (infiltration can be used in analysis)	
326.77 ft	Peak elevation of the 50-year storm event (infiltration can be used in analysis)	
327.67 ft	Elevation of the top of the practice (if a basin, this is the elevation of the berm)	
YES	10 peak elevation \leq Elevation of the top of the trench?	\leftarrow yes
YES	If a basin is proposed, 50-year peak elevation \leq Elevation of berm?	\leftarrow yes

1. Volume below the lowest invert of the outlet structure and excludes forebay volume
2. See NH Stormwater Manual, Vol.2, Ch.2-4, for guidance on determining the infiltration rate
3. 1' separation if treatment not required; 4' for treatment in GPAs & WSIPAs; & 3' in all other areas.

Designer's Notes:

Peak elevations for the 10 year and 50 year storm events assume infiltration is no longer occurring and stormwater within the BMP is flowing to the transverse drains at the low points.

Infiltration rates were determined from NRCS Ksat values for the soil type.

Bedrock elevation was determined from ledge lines on cross sections.

SHWT elevation is assumed to be at ledge elevation.

INFILTRATION PRACTICE DESIGN CRITERIA (Env-Wq 1508.05)

Type/Node Name: **Infiltration BMP #4A (Sta. 2073+50 to Sta. 2089+00)**

Enter the type of infiltration practice (e.g., trench) and the node name in the drainage analysis, if applicable

Yes	Have you reviewed Env-Wq 1508.05(a) to ensure that infiltration is allowed?	
1.39 ac	A = Area draining to the practice	
1.10 ac	A_I = Impervious area draining to the practice	
0.79 decimal	I = percent impervious area draining to the practice, in decimal form	
0.76 unitless	$Rv = \text{Runoff coefficient} = 0.05 + (0.9 \times I)$	
1.06 ac-in	$WQV = 1'' \times Rv \times A$	
3,846 cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
961 cf	25% x WQV (check calc for sediment forebay volume)	
<u>None</u>	Method of pretreatment? (not required for clean or roof runoff)	
- cf	V_{SED} = sediment forebay volume, if used for pretreatment	$\leftarrow \geq 25\% WQV$
4,534 cf	V = volume ¹ (attach a stage-storage table)	$\leftarrow \geq WQV$
60,450 sf	A_{SA} = surface area of the bottom of the pond	
0.70 iph	I_{DESIGN} = design infiltration rate ²	
1.3 hours	$T_{DRAIN} = \text{drain time} = V / (A_{SA} * I_{DESIGN})$	$\leftarrow \leq 72\text{-hrs}$
293.82 feet	E_{BTM} = elevation of the bottom of the practice	
291.00 feet	E_{SHWT} = elevation of SHWT (if none found, enter the lowest elevation of the test pit)	
281.60 feet	E_{ROCK} = elevation of bedrock (if none found, enter the lowest elevation of the test pit)	
2.82 feet	D_{SHWT} = separation from SHWT ³	$\leftarrow \geq *^3$
12.2 feet	D_{ROCK} = separation from bedrock ³	$\leftarrow \geq *^3$
ft	D_T = depth of trench, if trench proposed	$\leftarrow 4 - 10\text{ ft}$
No Yes/No	If a trench or underground system is proposed, observation well provided	
Stone	If a trench is proposed, material in trench	
N/A	If a basin is proposed, basin floor material	
N/A Yes/No	If a basin is proposed, the perimeter should be curvilinear.	
N/A :1	If a basin is proposed, pond side slopes	$\leftarrow \geq 3:1$
294.77 ft	Peak elevation of the 10-year storm event (infiltration can be used in analysis)	
295.16 ft	Peak elevation of the 50-year storm event (infiltration can be used in analysis)	
295.32 ft	Elevation of the top of the practice (if a basin, this is the elevation of the berm)	
YES	10 peak elevation \leq Elevation of the top of the trench?	\leftarrow yes
YES	If a basin is proposed, 50-year peak elevation \leq Elevation of berm?	\leftarrow yes

1. Volume below the lowest invert of the outlet structure and excludes forebay volume
2. See NH Stormwater Manual, Vol.2, Ch.2-4, for guidance on determining the infiltration rate
3. 1' separation if treatment not required; 4' for treatment in GPAs & WSIPAs; & 3' in all other areas.

Designer's Notes:

Peak elevations for the 10 year and 50 year storm events assume infiltration is no longer occurring and stormwater within the BMP is flowing to the transverse drains at the low points.

Infiltration rates were determined from NRCS Ksat values for the soil type.

Bedrock elevation was determined from ledge lines on cross sections.

SHWT elevation represents OHW of the Connecticut River. There is no nearby subsurface data.

INFILTRATION PRACTICE DESIGN CRITERIA (Env-Wq 1508.05)

Type/Node Name: **Infiltration BMP #5A (Sta. 2091+60 to Sta. 2099+10)**

Enter the type of infiltration practice (e.g., trench) and the node name in the drainage analysis, if applicable

Yes	Have you reviewed Env-Wq 1508.05(a) to ensure that infiltration is allowed?	
0.68 ac	A = Area draining to the practice	
0.54 ac	A_I = Impervious area draining to the practice	
0.79 decimal	I = percent impervious area draining to the practice, in decimal form	
0.76 unitless	$Rv = \text{Runoff coefficient} = 0.05 + (0.9 \times I)$	
0.52 ac-in	$WQV = 1'' \times Rv \times A$	
1,888 cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
472 cf	25% x WQV (check calc for sediment forebay volume)	
<u>None</u>	Method of pretreatment? (not required for clean or roof runoff)	
- cf	V_{SED} = sediment forebay volume, if used for pretreatment	$\leftarrow \geq 25\%WQV$
2,230 cf	V = volume ¹ (attach a stage-storage table)	$\leftarrow \geq WQV$
29,721 sf	A_{SA} = surface area of the bottom of the pond	
1.70 iph	I_{DESIGN} = design infiltration rate ²	
0.5 hours	$T_{DRAIN} = V / (A_{SA} * I_{DESIGN})$	$\leftarrow \leq 72\text{-hrs}$
295.34 feet	E_{BTM} = elevation of the bottom of the practice	
291.00 feet	E_{SHWT} = elevation of SHWT (if none found, enter the lowest elevation of the test pit)	
270.00 feet	E_{ROCK} = elevation of bedrock (if none found, enter the lowest elevation of the test pit)	
4.34 feet	D_{SHWT} = separation from SHWT ³	$\leftarrow \geq *^3$
25.3 feet	D_{ROCK} = separation from bedrock ³	$\leftarrow \geq *^3$
ft	D_T = depth of trench, if trench proposed	$\leftarrow 4 - 10\text{ ft}$
No Yes/No	If a trench or underground system is proposed, observation well provided	
Stone	If a trench is proposed, material in trench	
N/A	If a basin is proposed, basin floor material	
N/A Yes/No	If a basin is proposed, the perimeter should be curvilinear.	
N/A :1	If a basin is proposed, pond side slopes	$\leftarrow \geq 3:1$
295.97 ft	Peak elevation of the 10-year storm event (infiltration can be used in analysis)	
296.23 ft	Peak elevation of the 50-year storm event (infiltration can be used in analysis)	
296.84 ft	Elevation of the top of the practice (if a basin, this is the elevation of the berm)	
YES	10 peak elevation \leq Elevation of the top of the trench?	\leftarrow yes
YES	If a basin is proposed, 50-year peak elevation \leq Elevation of berm?	\leftarrow yes

1. Volume below the lowest invert of the outlet structure and excludes forebay volume
2. See NH Stormwater Manual, Vol.2, Ch.2-4, for guidance on determining the infiltration rate
3. 1' separation if treatment not required; 4' for treatment in GPAs & WSIPAs; & 3' in all other areas.

Designer's Notes:

Peak elevations for the 10 year and 50 year storm events assume infiltration is no longer occurring and stormwater within the BMP is flowing to the transverse drains at the low points.

Infiltration rates were determined from NRCS Ksat values for the soil type.

Bedrock elevation was determined from ledge lines on cross sections.

SHWT elevation represents OHW of the Connecticut River. There is no nearby subsurface data.

INFILTRATION PRACTICE DESIGN CRITERIA (Env-Wq 1508.05)

Type/Node Name: **Infiltration BMP #5B (Sta. 2099+10 to Sta. 2108+68)**

Enter the type of infiltration practice (e.g., trench) and the node name in the drainage analysis, if applicable

Yes	Have you reviewed Env-Wq 1508.05(a) to ensure that infiltration is allowed?	
0.88 ac	A = Area draining to the practice	
0.70 ac	A_I = Impervious area draining to the practice	
0.80 decimal	I = percent impervious area draining to the practice, in decimal form	
0.77 unitless	$Rv = \text{Runoff coefficient} = 0.05 + (0.9 \times I)$	
0.67 ac-in	$WQV = 1'' \times Rv \times A$	
2,447 cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
612 cf	25% x WQV (check calc for sediment forebay volume)	
<u>None</u>	Method of pretreatment? (not required for clean or roof runoff)	
- cf	V_{SED} = sediment forebay volume, if used for pretreatment	$\leftarrow \geq 25\% WQV$
2,874 cf	V = volume ¹ (attach a stage-storage table)	$\leftarrow \geq WQV$
38,320 sf	A_{SA} = surface area of the bottom of the pond	
1.70 iph	I_{DESIGN} = design infiltration rate ²	
0.5 hours	$T_{DRAIN} = V / (A_{SA} * I_{DESIGN})$	$\leftarrow \leq 72\text{-hrs}$
296.79 feet	E_{BTM} = elevation of the bottom of the practice	
290.20 feet	E_{SHWT} = elevation of SHWT (if none found, enter the lowest elevation of the test pit)	
260.00 feet	E_{ROCK} = elevation of bedrock (if none found, enter the lowest elevation of the test pit)	
6.59 feet	D_{SHWT} = separation from SHWT ³	$\leftarrow \geq *^3$
36.8 feet	D_{ROCK} = separation from bedrock ³	$\leftarrow \geq *^3$
ft	D_T = depth of trench, if trench proposed	$\leftarrow 4 - 10\text{ ft}$
No Yes/No	If a trench or underground system is proposed, observation well provided	
Stone	If a trench is proposed, material in trench	
N/A	If a basin is proposed, basin floor material	
N/A Yes/No	If a basin is proposed, the perimeter should be curvilinear.	
N/A :1	If a basin is proposed, pond side slopes	$\leftarrow \geq 3:1$
297.41 ft	Peak elevation of the 10-year storm event (infiltration can be used in analysis)	
297.59 ft	Peak elevation of the 50-year storm event (infiltration can be used in analysis)	
298.29 ft	Elevation of the top of the practice (if a basin, this is the elevation of the berm)	
YES	10 peak elevation \leq Elevation of the top of the trench?	\leftarrow yes
YES	If a basin is proposed, 50-year peak elevation \leq Elevation of berm?	\leftarrow yes

1. Volume below the lowest invert of the outlet structure and excludes forebay volume
2. See NH Stormwater Manual, Vol.2, Ch.2-4, for guidance on determining the infiltration rate
3. 1' separation if treatment not required; 4' for treatment in GPAs & WSIPAs; & 3' in all other areas.

Designer's Notes:

Peak elevations for the 10 year and 50 year storm events assume infiltration is no longer occurring and stormwater within the BMP is flowing to the transverse drains at the low points.

Infiltration rates were determined from NRCS Ksat values for the soil type.

Bedrock elevation is below the cross section grid. The lowest elevation on the grid was entered.

SHWT elevation was determined from nearest boring.

INFILTRATION PRACTICE DESIGN CRITERIA (Env-Wq 1508.05)

Type/Node Name: **Infiltration BMP #5C (Sta. 2108+68 to Sta. 2121+61)**

Enter the type of infiltration practice (e.g., trench) and the node name in the drainage analysis, if applicable

Yes	Have you reviewed Env-Wq 1508.05(a) to ensure that infiltration is allowed?	
1.19 ac	A = Area draining to the practice	
0.95 ac	A_I = Impervious area draining to the practice	
0.80 decimal	I = percent impervious area draining to the practice, in decimal form	
0.77 unitless	$Rv = \text{Runoff coefficient} = 0.05 + (0.9 \times I)$	
0.91 ac-in	$WQV = 1'' \times Rv \times A$	
3,320 cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
830 cf	25% x WQV (check calc for sediment forebay volume)	
<u>None</u>	Method of pretreatment? (not required for clean or roof runoff)	
- cf	V_{SED} = sediment forebay volume, if used for pretreatment	$\leftarrow \geq 25\%WQV$
3,879 cf	V = volume ¹ (attach a stage-storage table)	$\leftarrow \geq WQV$
51,720 sf	A_{SA} = surface area of the bottom of the pond	
1.70 iph	I_{DESIGN} = design infiltration rate ²	
0.5 hours	$T_{DRAIN} = V / (A_{SA} * I_{DESIGN})$	$\leftarrow \leq 72\text{-hrs}$
295.71 feet	E_{BTM} = elevation of the bottom of the practice	
291.00 feet	E_{SHWT} = elevation of SHWT (if none found, enter the lowest elevation of the test pit)	
260.00 feet	E_{ROCK} = elevation of bedrock (if none found, enter the lowest elevation of the test pit)	
4.71 feet	D_{SHWT} = separation from SHWT ³	$\leftarrow \geq *^3$
35.7 feet	D_{ROCK} = separation from bedrock ³	$\leftarrow \geq *^3$
ft	D_T = depth of trench, if trench proposed	$\leftarrow 4 - 10\text{ ft}$
No Yes/No	If a trench or underground system is proposed, observation well provided	
Stone	If a trench is proposed, material in trench	
N/A	If a basin is proposed, basin floor material	
N/A Yes/No	If a basin is proposed, the perimeter should be curvilinear.	
N/A :1	If a basin is proposed, pond side slopes	$\leftarrow \geq 3:1$
296.55 ft	Peak elevation of the 10-year storm event (infiltration can be used in analysis)	
296.88 ft	Peak elevation of the 50-year storm event (infiltration can be used in analysis)	
297.21 ft	Elevation of the top of the practice (if a basin, this is the elevation of the berm)	
YES	10 peak elevation \leq Elevation of the top of the trench?	\leftarrow yes
YES	If a basin is proposed, 50-year peak elevation \leq Elevation of berm?	\leftarrow yes

1. Volume below the lowest invert of the outlet structure and excludes forebay volume
2. See NH Stormwater Manual, Vol.2, Ch.2-4, for guidance on determining the infiltration rate
3. 1' separation if treatment not required; 4' for treatment in GPAs & WSIPAs; & 3' in all other areas.

Designer's Notes:

Peak elevations for the 10 year and 50 year storm events assume infiltration is no longer occurring and stormwater within the BMP is flowing to the transverse drains at the low points.

Infiltration rates were determined from NRCS Ksat values for the soil type.

Bedrock elevation is below the cross section grid. The lowest elevation on the grid was entered.

SHWT elevation represents OHW of the Connecticut River. There is no nearby subsurface data.

INFILTRATION PRACTICE DESIGN CRITERIA (Env-Wq 1508.05)

Type/Node Name: **Infiltration BMP #5D (Sta. 2121+61 to Sta. 2130+00)**

Enter the type of infiltration practice (e.g., trench) and the node name in the drainage analysis, if applicable

Yes	Have you reviewed Env-Wq 1508.05(a) to ensure that infiltration is allowed?	
0.76 ac	A = Area draining to the practice	
0.60 ac	A_I = Impervious area draining to the practice	
0.79 decimal	I = percent impervious area draining to the practice, in decimal form	
0.76 unitless	$Rv = \text{Runoff coefficient} = 0.05 + (0.9 \times I)$	
0.58 ac-in	$WQV = 1'' \times Rv \times A$	
2,098 cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
525 cf	25% x WQV (check calc for sediment forebay volume)	
<u>None</u>	Method of pretreatment? (not required for clean or roof runoff)	
- cf	V_{SED} = sediment forebay volume, if used for pretreatment	$\leftarrow \geq 25\% WQV$
2,480 cf	V = volume ¹ (attach a stage-storage table)	$\leftarrow \geq WQV$
33,060 sf	A_{SA} = surface area of the bottom of the pond	
1.70 iph	I_{DESIGN} = design infiltration rate ²	
0.5 hours	$T_{DRAIN} = V / (A_{SA} * I_{DESIGN})$	$\leftarrow \leq 72\text{-hrs}$
295.86 feet	E_{BTM} = elevation of the bottom of the practice	
291.60 feet	E_{SHWT} = elevation of SHWT (if none found, enter the lowest elevation of the test pit)	
260.00 feet	E_{ROCK} = elevation of bedrock (if none found, enter the lowest elevation of the test pit)	
4.26 feet	D_{SHWT} = separation from SHWT ³	$\leftarrow \geq *^3$
35.9 feet	D_{ROCK} = separation from bedrock ³	$\leftarrow \geq *^3$
ft	D_T = depth of trench, if trench proposed	$\leftarrow 4 - 10\text{ ft}$
No Yes/No	If a trench or underground system is proposed, observation well provided	
Stone	If a trench is proposed, material in trench	
N/A	If a basin is proposed, basin floor material	
N/A Yes/No	If a basin is proposed, the perimeter should be curvilinear.	
N/A :1	If a basin is proposed, pond side slopes	$\leftarrow \geq 3:1$
296.56 ft	Peak elevation of the 10-year storm event (infiltration can be used in analysis)	
296.83 ft	Peak elevation of the 50-year storm event (infiltration can be used in analysis)	
297.36 ft	Elevation of the top of the practice (if a basin, this is the elevation of the berm)	
YES	10 peak elevation \leq Elevation of the top of the trench?	\leftarrow yes
YES	If a basin is proposed, 50-year peak elevation \leq Elevation of berm?	\leftarrow yes

1. Volume below the lowest invert of the outlet structure and excludes forebay volume
2. See NH Stormwater Manual, Vol.2, Ch.2-4, for guidance on determining the infiltration rate
3. 1' separation if treatment not required; 4' for treatment in GPAs & WSIPAs; & 3' in all other areas.

Designer's Notes:

Peak elevations for the 10 year and 50 year storm events assume infiltration is no longer occurring and stormwater within the BMP is flowing to the transverse drains at the low points.

Infiltration rates were determined from NRCS Ksat values for the soil type.

Bedrock elevation is below the cross section grid. The lowest elevation on the grid was entered.

SHWT elevation was determined from nearest boring.

14747 Infiltration BMPs

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Type III 24-hr 50 Year Rainfall=5.64"

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Stage-Area-Storage for Pond 2P: BMP 1A (Sta 2013+18 - DN 103)

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
317.10	0	317.64	2,081
317.11	38	317.65	2,130
317.12	75	317.66	2,180
317.13	113	317.67	2,230
317.14	151	317.68	2,279
317.15	188	317.69	2,329
317.16	226	317.70	2,379
317.17	263	317.71	2,429
317.18	301	317.72	2,478
317.19	339	317.73	2,528
317.20	376	317.74	2,578
317.21	414	317.75	2,628
317.22	452	317.76	2,677
317.23	489	317.77	2,727
317.24	527	317.78	2,777
317.25	564	317.79	2,826
317.26	602	317.80	2,876
317.27	640	317.81	2,926
317.28	677	317.82	2,976
317.29	715	317.83	3,025
317.30	753	317.84	3,075
317.31	790	317.85	3,125
317.32	828	317.86	3,175
317.33	866	317.87	3,224
317.34	903	317.88	3,274
317.35	941	317.89	3,324
317.36	978	317.90	3,373
317.37	1,016	317.91	3,423
317.38	1,054	317.92	3,473
317.39	1,091	317.93	3,523
317.40	1,129	317.94	3,572
317.41	1,167	317.95	3,622
317.42	1,204	317.96	3,672
317.43	1,242	317.97	3,722
317.44	1,279	317.98	3,771
317.45	1,317	317.99	3,821
317.46	1,355	318.00	3,871
317.47	1,392	318.01	3,920
317.48	1,430	318.02	3,970
317.49	1,468	318.03	4,020
317.50	1,505	318.04	4,070
317.51	1,543	318.05	4,119
317.52	1,581	318.06	4,169
317.53	1,618	318.07	4,219
317.54	1,656	318.08	4,269
317.55	1,693	318.09	4,318
317.56	1,731	318.10	4,368
317.57	1,769		
317.58	1,806		
317.59	1,844		
317.60	1,882		
317.61	1,931		
317.62	1,981		
317.63	2,031		

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Stage-Area-Storage for Pond 4P: BMP 1B (Sta 2022+54.5 - DN B1)

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
319.52	0	320.06	1,264
319.53	23	320.07	1,289
319.54	47	320.08	1,314
319.55	70	320.09	1,338
319.56	93	320.10	1,363
319.57	117	320.11	1,388
319.58	140	320.12	1,412
319.59	163	320.13	1,437
319.60	186	320.14	1,462
319.61	210	320.15	1,487
319.62	233	320.16	1,511
319.63	256	320.17	1,536
319.64	280	320.18	1,561
319.65	303	320.19	1,585
319.66	326	320.20	1,610
319.67	350	320.21	1,635
319.68	373	320.22	1,660
319.69	396	320.23	1,684
319.70	419	320.24	1,709
319.71	443	320.25	1,734
319.72	466	320.26	1,758
319.73	489	320.27	1,783
319.74	513	320.28	1,808
319.75	536	320.29	1,833
319.76	559	320.30	1,857
319.77	583	320.31	1,882
319.78	606	320.32	1,907
319.79	629	320.33	1,932
319.80	653	320.34	1,956
319.81	676	320.35	1,981
319.82	699	320.36	2,006
319.83	722	320.37	2,030
319.84	746	320.38	2,055
319.85	769	320.39	2,080
319.86	792	320.40	2,105
319.87	816	320.41	2,129
319.88	839	320.42	2,154
319.89	862	320.43	2,179
319.90	886	320.44	2,203
319.91	909	320.45	2,228
319.92	932	320.46	2,253
319.93	955	320.47	2,278
319.94	979	320.48	2,302
319.95	1,002	320.49	2,327
319.96	1,025	320.50	2,352
319.97	1,049	320.51	2,376
319.98	1,072	320.52	2,401
319.99	1,095		
320.00	1,119		
320.01	1,142		
320.02	1,165		
320.03	1,190		
320.04	1,215		
320.05	1,239		

Stage-Area-Storage for Pond 6P: BMP 2A (Sta 2025+05 - DN 112)

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
321.02	0	321.56	658
321.03	12	321.57	675
321.04	23	321.58	693
321.05	35	321.59	711
321.06	47	321.60	729
321.07	59	321.61	747
321.08	70	321.62	765
321.09	82	321.63	782
321.10	94	321.64	800
321.11	106	321.65	818
321.12	117	321.66	836
321.13	129	321.67	854
321.14	141	321.68	872
321.15	152	321.69	889
321.16	164	321.70	907
321.17	176	321.71	925
321.18	188	321.72	943
321.19	199	321.73	961
321.20	211	321.74	979
321.21	223	321.75	996
321.22	234	321.76	1,014
321.23	246	321.77	1,032
321.24	258	321.78	1,050
321.25	270	321.79	1,068
321.26	281	321.80	1,085
321.27	293	321.81	1,103
321.28	305	321.82	1,121
321.29	317	321.83	1,139
321.30	328	321.84	1,157
321.31	340	321.85	1,175
321.32	352	321.86	1,192
321.33	363	321.87	1,210
321.34	375	321.88	1,228
321.35	387	321.89	1,246
321.36	399	321.90	1,264
321.37	410	321.91	1,282
321.38	422	321.92	1,299
321.39	434	321.93	1,317
321.40	446	321.94	1,335
321.41	457	321.95	1,353
321.42	469	321.96	1,371
321.43	481	321.97	1,389
321.44	492	321.98	1,406
321.45	504	321.99	1,424
321.46	516	322.00	1,442
321.47	528	322.01	1,460
321.48	539	322.02	1,478
321.49	551		
321.50	563		
321.51	574		
321.52	586		
321.53	604		
321.54	622		
321.55	640		

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Stage-Area-Storage for Pond 8P: BMP 2B (Sta 2033+31 - DN 118)

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
321.70	0	322.24	1,876
321.71	34	322.25	1,923
321.72	67	322.26	1,971
321.73	101	322.27	2,018
321.74	135	322.28	2,066
321.75	169	322.29	2,113
321.76	202	322.30	2,161
321.77	236	322.31	2,208
321.78	270	322.32	2,256
321.79	303	322.33	2,303
321.80	337	322.34	2,351
321.81	371	322.35	2,398
321.82	405	322.36	2,446
321.83	438	322.37	2,493
321.84	472	322.38	2,541
321.85	506	322.39	2,588
321.86	540	322.40	2,636
321.87	573	322.41	2,683
321.88	607	322.42	2,731
321.89	641	322.43	2,778
321.90	674	322.44	2,826
321.91	708	322.45	2,873
321.92	742	322.46	2,921
321.93	776	322.47	2,968
321.94	809	322.48	3,016
321.95	843	322.49	3,063
321.96	877	322.50	3,111
321.97	910	322.51	3,158
321.98	944	322.52	3,206
321.99	978	322.53	3,253
322.00	1,012	322.54	3,301
322.01	1,045	322.55	3,348
322.02	1,079	322.56	3,396
322.03	1,113	322.57	3,443
322.04	1,146	322.58	3,491
322.05	1,180	322.59	3,538
322.06	1,214	322.60	3,586
322.07	1,248	322.61	3,633
322.08	1,281	322.62	3,681
322.09	1,315	322.63	3,728
322.10	1,349	322.64	3,776
322.11	1,383	322.65	3,823
322.12	1,416	322.66	3,871
322.13	1,450	322.67	3,918
322.14	1,484	322.68	3,966
322.15	1,517	322.69	4,013
322.16	1,551	322.70	4,061
322.17	1,585		
322.18	1,619		
322.19	1,652		
322.20	1,686		
322.21	1,733		
322.22	1,781		
322.23	1,828		

Stage-Area-Storage for Pond 10P: BMP 3A (Sta 2053+00 - DN 131)

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
324.31	0	324.85	3,040
324.32	55	324.86	3,115
324.33	110	324.87	3,189
324.34	164	324.88	3,264
324.35	219	324.89	3,339
324.36	274	324.90	3,414
324.37	329	324.91	3,488
324.38	384	324.92	3,563
324.39	439	324.93	3,638
324.40	493	324.94	3,713
324.41	548	324.95	3,787
324.42	603	324.96	3,862
324.43	658	324.97	3,937
324.44	713	324.98	4,012
324.45	767	324.99	4,086
324.46	822	325.00	4,161
324.47	877	325.01	4,236
324.48	932	325.02	4,311
324.49	987	325.03	4,386
324.50	1,042	325.04	4,460
324.51	1,096	325.05	4,535
324.52	1,151	325.06	4,610
324.53	1,206	325.07	4,685
324.54	1,261	325.08	4,759
324.55	1,316	325.09	4,834
324.56	1,370	325.10	4,909
324.57	1,425	325.11	4,984
324.58	1,480	325.12	5,058
324.59	1,535	325.13	5,133
324.60	1,590	325.14	5,208
324.61	1,644	325.15	5,283
324.62	1,699	325.16	5,357
324.63	1,754	325.17	5,432
324.64	1,809	325.18	5,507
324.65	1,864	325.19	5,582
324.66	1,919	325.20	5,656
324.67	1,973	325.21	5,731
324.68	2,028	325.22	5,806
324.69	2,083	325.23	5,881
324.70	2,138	325.24	5,955
324.71	2,193	325.25	6,030
324.72	2,247	325.26	6,105
324.73	2,302	325.27	6,180
324.74	2,357	325.28	6,255
324.75	2,412	325.29	6,329
324.76	2,467	325.30	6,404
324.77	2,522	325.31	6,479
324.78	2,576		
324.79	2,631		
324.80	2,686		
324.81	2,741		
324.82	2,816		
324.83	2,890		
324.84	2,965		

14747 Infiltration BMPs

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Stage-Area-Storage for Pond 12P: BMP 3B (Sta 2061+98.5 - DN B2)

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
326.67	0	327.21	977
326.68	18	327.22	995
326.69	36	327.23	1,013
326.70	54	327.24	1,031
326.71	72	327.25	1,050
326.72	90	327.26	1,068
326.73	109	327.27	1,086
326.74	127	327.28	1,104
326.75	145	327.29	1,122
326.76	163	327.30	1,140
326.77	181	327.31	1,158
326.78	199	327.32	1,176
326.79	217	327.33	1,194
326.80	235	327.34	1,212
326.81	253	327.35	1,231
326.82	271	327.36	1,249
326.83	290	327.37	1,267
326.84	308	327.38	1,285
326.85	326	327.39	1,303
326.86	344	327.40	1,321
326.87	362	327.41	1,339
326.88	380	327.42	1,357
326.89	398	327.43	1,375
326.90	416	327.44	1,393
326.91	434	327.45	1,411
326.92	452	327.46	1,430
326.93	470	327.47	1,448
326.94	489	327.48	1,466
326.95	507	327.49	1,484
326.96	525	327.50	1,502
326.97	543	327.51	1,520
326.98	561	327.52	1,538
326.99	579	327.53	1,556
327.00	597	327.54	1,574
327.01	615	327.55	1,592
327.02	633	327.56	1,611
327.03	651	327.57	1,629
327.04	670	327.58	1,647
327.05	688	327.59	1,665
327.06	706	327.60	1,683
327.07	724	327.61	1,701
327.08	742	327.62	1,719
327.09	760	327.63	1,737
327.10	778	327.64	1,755
327.11	796	327.65	1,773
327.12	814	327.66	1,792
327.13	832	327.67	1,810
327.14	851		
327.15	869		
327.16	887		
327.17	905		
327.18	923		
327.19	941		
327.20	959		

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Stage-Area-Storage for Pond 14P: BMP 4A (Sta 2086+80 - DN B3)

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
294.32	0	294.86	2,865
294.33	52	294.87	2,933
294.34	104	294.88	3,000
294.35	156	294.89	3,068
294.36	208	294.90	3,135
294.37	259	294.91	3,203
294.38	311	294.92	3,271
294.39	363	294.93	3,338
294.40	415	294.94	3,406
294.41	467	294.95	3,474
294.42	519	294.96	3,541
294.43	571	294.97	3,609
294.44	623	294.98	3,677
294.45	675	294.99	3,744
294.46	726	295.00	3,812
294.47	778	295.01	3,879
294.48	830	295.02	3,947
294.49	882	295.03	4,015
294.50	934	295.04	4,082
294.51	986	295.05	4,150
294.52	1,038	295.06	4,218
294.53	1,090	295.07	4,285
294.54	1,142	295.08	4,353
294.55	1,193	295.09	4,420
294.56	1,245	295.10	4,488
294.57	1,297	295.11	4,556
294.58	1,349	295.12	4,623
294.59	1,401	295.13	4,691
294.60	1,453	295.14	4,759
294.61	1,505	295.15	4,826
294.62	1,557	295.16	4,894
294.63	1,609	295.17	4,962
294.64	1,660	295.18	5,029
294.65	1,712	295.19	5,097
294.66	1,764	295.20	5,164
294.67	1,816	295.21	5,232
294.68	1,868	295.22	5,300
294.69	1,920	295.23	5,367
294.70	1,972	295.24	5,435
294.71	2,024	295.25	5,503
294.72	2,076	295.26	5,570
294.73	2,127	295.27	5,638
294.74	2,179	295.28	5,705
294.75	2,231	295.29	5,773
294.76	2,283	295.30	5,841
294.77	2,335	295.31	5,908
294.78	2,387	295.32	5,976
294.79	2,439		
294.80	2,491		
294.81	2,543		
294.82	2,594		
294.83	2,662		
294.84	2,730		
294.85	2,797		

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Stage-Area-Storage for Pond 16P: BMP 5A (Sta 2091+61.5 - DN B4)

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
295.84	0	296.38	1,345
295.85	24	296.39	1,385
295.86	47	296.40	1,425
295.87	71	296.41	1,465
295.88	95	296.42	1,505
295.89	119	296.43	1,545
295.90	142	296.44	1,584
295.91	166	296.45	1,624
295.92	190	296.46	1,664
295.93	213	296.47	1,704
295.94	237	296.48	1,744
295.95	261	296.49	1,784
295.96	285	296.50	1,824
295.97	308	296.51	1,864
295.98	332	296.52	1,904
295.99	356	296.53	1,943
296.00	379	296.54	1,983
296.01	403	296.55	2,023
296.02	427	296.56	2,063
296.03	451	296.57	2,103
296.04	474	296.58	2,143
296.05	498	296.59	2,183
296.06	522	296.60	2,223
296.07	545	296.61	2,263
296.08	569	296.62	2,302
296.09	593	296.63	2,342
296.10	617	296.64	2,382
296.11	640	296.65	2,422
296.12	664	296.66	2,462
296.13	688	296.67	2,502
296.14	711	296.68	2,542
296.15	735	296.69	2,582
296.16	759	296.70	2,622
296.17	782	296.71	2,661
296.18	806	296.72	2,701
296.19	830	296.73	2,741
296.20	854	296.74	2,781
296.21	877	296.75	2,821
296.22	901	296.76	2,861
296.23	925	296.77	2,901
296.24	948	296.78	2,941
296.25	972	296.79	2,981
296.26	996	296.80	3,020
296.27	1,020	296.81	3,060
296.28	1,043	296.82	3,100
296.29	1,067	296.83	3,140
296.30	1,091	296.84	3,180
296.31	1,114		
296.32	1,138		
296.33	1,162		
296.34	1,186		
296.35	1,225		
296.36	1,265		
296.37	1,305		

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Stage-Area-Storage for Pond 18P: BMP 5B (Sta 2103+90 - DN 153)

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
297.29	0	297.83	4,019
297.30	72	297.84	4,130
297.31	143	297.85	4,240
297.32	215	297.86	4,351
297.33	286	297.87	4,461
297.34	358	297.88	4,572
297.35	429	297.89	4,682
297.36	501	297.90	4,793
297.37	572	297.91	4,903
297.38	644	297.92	5,014
297.39	715	297.93	5,124
297.40	787	297.94	5,235
297.41	859	297.95	5,345
297.42	930	297.96	5,456
297.43	1,002	297.97	5,566
297.44	1,073	297.98	5,677
297.45	1,145	297.99	5,787
297.46	1,216	298.00	5,898
297.47	1,288	298.01	6,008
297.48	1,359	298.02	6,119
297.49	1,431	298.03	6,229
297.50	1,502	298.04	6,340
297.51	1,574	298.05	6,450
297.52	1,646	298.06	6,561
297.53	1,717	298.07	6,671
297.54	1,789	298.08	6,782
297.55	1,860	298.09	6,892
297.56	1,932	298.10	7,003
297.57	2,003	298.11	7,113
297.58	2,075	298.12	7,224
297.59	2,146	298.13	7,334
297.60	2,218	298.14	7,445
297.61	2,289	298.15	7,555
297.62	2,361	298.16	7,666
297.63	2,432	298.17	7,776
297.64	2,504	298.18	7,887
297.65	2,576	298.19	7,997
297.66	2,647	298.20	8,108
297.67	2,719	298.21	8,218
297.68	2,790	298.22	8,329
297.69	2,862	298.23	8,439
297.70	2,933	298.24	8,550
297.71	3,005	298.25	8,660
297.72	3,076	298.26	8,771
297.73	3,148	298.27	8,881
297.74	3,219	298.28	8,992
297.75	3,291	298.29	9,102
297.76	3,363		
297.77	3,434		
297.78	3,506		
297.79	3,577		
297.80	3,688		
297.81	3,798		
297.82	3,909		

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Stage-Area-Storage for Pond 20P: BMP 5C (Sta 2114+40 - DN 160)

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
296.21	0	296.75	2,996
296.22	54	296.76	3,074
296.23	107	296.77	3,152
296.24	161	296.78	3,230
296.25	215	296.79	3,308
296.26	268	296.80	3,386
296.27	322	296.81	3,464
296.28	376	296.82	3,542
296.29	430	296.83	3,620
296.30	483	296.84	3,698
296.31	537	296.85	3,776
296.32	591	296.86	3,854
296.33	644	296.87	3,932
296.34	698	296.88	4,010
296.35	752	296.89	4,088
296.36	805	296.90	4,165
296.37	859	296.91	4,243
296.38	913	296.92	4,321
296.39	966	296.93	4,399
296.40	1,020	296.94	4,477
296.41	1,074	296.95	4,555
296.42	1,127	296.96	4,633
296.43	1,181	296.97	4,711
296.44	1,235	296.98	4,789
296.45	1,289	296.99	4,867
296.46	1,342	297.00	4,945
296.47	1,396	297.01	5,023
296.48	1,450	297.02	5,101
296.49	1,503	297.03	5,179
296.50	1,557	297.04	5,257
296.51	1,611	297.05	5,335
296.52	1,664	297.06	5,413
296.53	1,718	297.07	5,491
296.54	1,772	297.08	5,569
296.55	1,825	297.09	5,647
296.56	1,879	297.10	5,725
296.57	1,933	297.11	5,802
296.58	1,986	297.12	5,880
296.59	2,040	297.13	5,958
296.60	2,094	297.14	6,036
296.61	2,148	297.15	6,114
296.62	2,201	297.16	6,192
296.63	2,255	297.17	6,270
296.64	2,309	297.18	6,348
296.65	2,362	297.19	6,426
296.66	2,416	297.20	6,504
296.67	2,470	297.21	6,582
296.68	2,523		
296.69	2,577		
296.70	2,631		
296.71	2,684		
296.72	2,762		
296.73	2,840		
296.74	2,918		

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Stage-Area-Storage for Pond 22P: BMP 5D (Sta 2128+24 - DN 168)

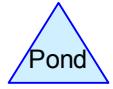
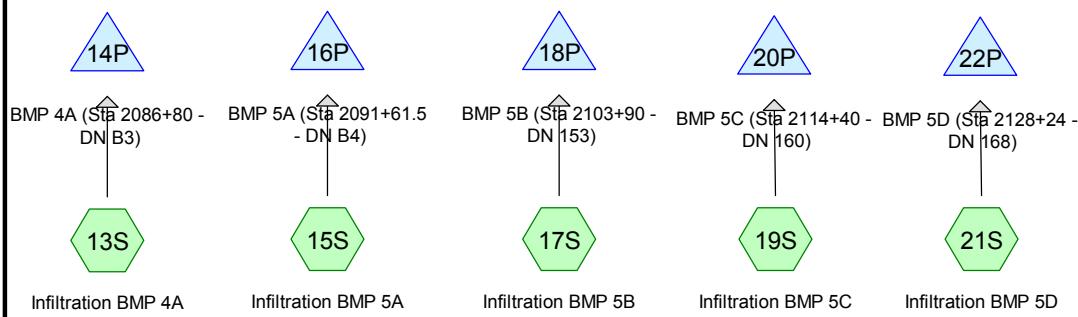
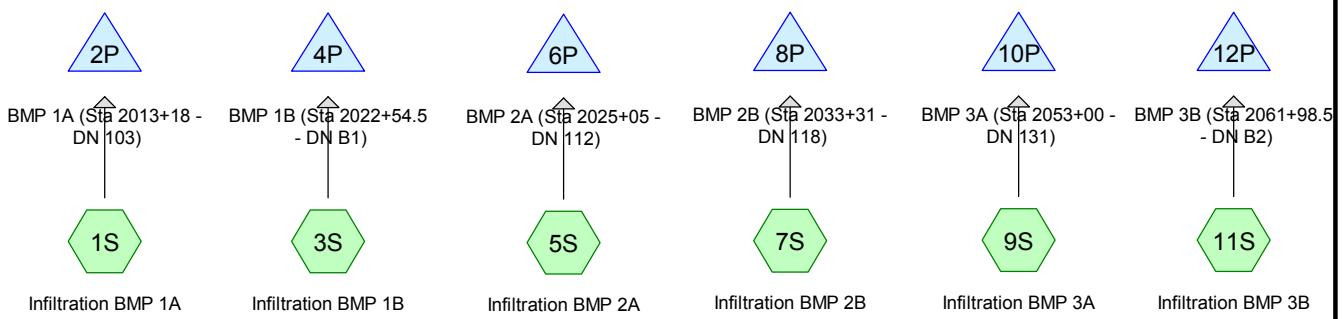
Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
296.36	0	296.90	2,487
296.37	45	296.91	2,544
296.38	90	296.92	2,601
296.39	136	296.93	2,659
296.40	181	296.94	2,716
296.41	226	296.95	2,773
296.42	271	296.96	2,830
296.43	316	296.97	2,887
296.44	361	296.98	2,944
296.45	407	296.99	3,002
296.46	452	297.00	3,059
296.47	497	297.01	3,116
296.48	542	297.02	3,173
296.49	587	297.03	3,230
296.50	632	297.04	3,287
296.51	678	297.05	3,345
296.52	723	297.06	3,402
296.53	768	297.07	3,459
296.54	813	297.08	3,516
296.55	858	297.09	3,573
296.56	903	297.10	3,630
296.57	949	297.11	3,688
296.58	994	297.12	3,745
296.59	1,039	297.13	3,802
296.60	1,084	297.14	3,859
296.61	1,129	297.15	3,916
296.62	1,174	297.16	3,973
296.63	1,220	297.17	4,031
296.64	1,265	297.18	4,088
296.65	1,310	297.19	4,145
296.66	1,355	297.20	4,202
296.67	1,400	297.21	4,259
296.68	1,445	297.22	4,316
296.69	1,491	297.23	4,374
296.70	1,536	297.24	4,431
296.71	1,581	297.25	4,488
296.72	1,626	297.26	4,545
296.73	1,671	297.27	4,602
296.74	1,716	297.28	4,659
296.75	1,762	297.29	4,717
296.76	1,807	297.30	4,774
296.77	1,852	297.31	4,831
296.78	1,897	297.32	4,888
296.79	1,942	297.33	4,945
296.80	1,987	297.34	5,002
296.81	2,033	297.35	5,060
296.82	2,078	297.36	5,117
296.83	2,123		
296.84	2,168		
296.85	2,213		
296.86	2,258		
296.87	2,316		
296.88	2,373		
296.89	2,430		

New Hampshire Department of Transportation
Walpole-Charlestown, X-A000(487),14747
N.H. Route 12 Reconstruction

POLLUTANT LOADING ANALYSIS REPORT

APPENDIX 7:

HYDROCAD RESULTS FOR 10 AND 50 YEAR STORM EVENTS



Drainage Diagram for 14747 Infiltration BMPs

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Time span=1.00-24.00 hrs, dt=0.01 hrs, 2301 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Infiltration BMP 1A	Runoff Area=33,000 sf 100.00% Impervious Runoff Depth>3.67" Tc=5.0 min CN=98 Runoff=2.99 cfs 0.232 af
Subcatchment 3S: Infiltration BMP 1B	Runoff Area=8,538 sf 100.00% Impervious Runoff Depth>3.67" Tc=5.0 min CN=98 Runoff=0.77 cfs 0.060 af
Subcatchment 5S: Infiltration BMP 2A	Runoff Area=15,259 sf 100.00% Impervious Runoff Depth>3.67" Tc=5.0 min CN=98 Runoff=1.38 cfs 0.107 af
Subcatchment 7S: Infiltration BMP 2B	Runoff Area=40,720 sf 100.00% Impervious Runoff Depth>3.67" Tc=5.0 min CN=98 Runoff=3.69 cfs 0.286 af
Subcatchment 9S: Infiltration BMP 3A	Runoff Area=45,436 sf 100.00% Impervious Runoff Depth>3.67" Tc=5.0 min CN=98 Runoff=4.12 cfs 0.319 af
Subcatchment 11S: Infiltration BMP 3B	Runoff Area=5,889 sf 100.00% Impervious Runoff Depth>3.67" Tc=5.0 min CN=98 Runoff=0.53 cfs 0.041 af
Subcatchment 13S: Infiltration BMP 4A	Runoff Area=60,450 sf 100.00% Impervious Runoff Depth>3.67" Tc=5.0 min CN=98 Runoff=5.48 cfs 0.425 af
Subcatchment 15S: Infiltration BMP 5A	Runoff Area=29,721 sf 100.00% Impervious Runoff Depth>3.67" Tc=5.0 min CN=98 Runoff=2.69 cfs 0.209 af
Subcatchment 17S: Infiltration BMP 5B	Runoff Area=38,320 sf 100.00% Impervious Runoff Depth>3.67" Tc=5.0 min CN=98 Runoff=3.47 cfs 0.269 af
Subcatchment 19S: Infiltration BMP 5C	Runoff Area=51,720 sf 100.00% Impervious Runoff Depth>3.67" Tc=5.0 min CN=98 Runoff=4.69 cfs 0.363 af
Subcatchment 21S: Infiltration BMP 5D	Runoff Area=33,060 sf 100.00% Impervious Runoff Depth>3.67" Tc=5.0 min CN=98 Runoff=3.00 cfs 0.232 af
Pond 2P: BMP 1A (Sta 2013+18 - DN 103)	Peak Elev=317.17' Storage=275 cf Inflow=2.99 cfs 0.232 af Outflow=2.18 cfs 0.232 af
Pond 4P: BMP 1B (Sta 2022+54.5 - DN B1)	Peak Elev=319.52' Storage=9 cf Inflow=0.77 cfs 0.060 af Outflow=0.77 cfs 0.060 af
Pond 6P: BMP 2A (Sta 2025+05 - DN 112)	Peak Elev=321.10' Storage=89 cf Inflow=1.38 cfs 0.107 af Outflow=1.10 cfs 0.107 af
Pond 8P: BMP 2B (Sta 2033+31 - DN 118)	Peak Elev=321.92' Storage=732 cf Inflow=3.69 cfs 0.286 af Outflow=2.04 cfs 0.286 af
Pond 10P: BMP 3A (Sta 2053+00 - DN 131)	Peak Elev=324.48' Storage=912 cf Inflow=4.12 cfs 0.319 af Outflow=2.15 cfs 0.319 af

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Pond 12P: BMP 3B (Sta 2061+98.5 - DN B2)	Peak Elev=326.72' Storage=92 cf Inflow=0.53 cfs 0.041 af Outflow=0.39 cfs 0.041 af
Pond 14P: BMP 4A (Sta 2086+80 - DN B3)	Peak Elev=294.77' Storage=2,334 cf Inflow=5.48 cfs 0.425 af Outflow=1.98 cfs 0.425 af
Pond 16P: BMP 5A (Sta 2091+61.5 - DN B4)	Peak Elev=295.97' Storage=297 cf Inflow=2.69 cfs 0.209 af Outflow=1.87 cfs 0.209 af
Pond 18P: BMP 5B (Sta 2103+90 - DN 153)	Peak Elev=297.41' Storage=878 cf Inflow=3.47 cfs 0.269 af Outflow=1.71 cfs 0.269 af
Pond 20P: BMP 5C (Sta 2114+40 - DN 160)	Peak Elev=296.55' Storage=1,821 cf Inflow=4.69 cfs 0.363 af Outflow=1.75 cfs 0.363 af
Pond 22P: BMP 5D (Sta 2128+24 - DN 168)	Peak Elev=296.56' Storage=903 cf Inflow=3.00 cfs 0.232 af Outflow=1.33 cfs 0.232 af

Total Runoff Area = 8.313 ac Runoff Volume = 2.544 af Average Runoff Depth = 3.67"
0.00% Pervious = 0.000 ac 100.00% Impervious = 8.313 ac

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Summary for Subcatchment 1S: Infiltration BMP 1A

Contributing Area: From Sta. 2012+25 to Sta. 2020+50

Runoff = 2.99 cfs @ 12.07 hrs, Volume= 0.232 af, Depth> 3.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=3.91"

Area (sf)	CN	Description
33,000	98	Paved parking, HSG C
33,000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, NH 12 pavement

Summary for Subcatchment 3S: Infiltration BMP 1B

Contributing Area: From Sta. 2020+50 to Sta. 2022+56

Runoff = 0.77 cfs @ 12.07 hrs, Volume= 0.060 af, Depth> 3.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=3.91"

Area (sf)	CN	Description
8,538	98	Paved parking, HSG C
8,538		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, NH 12 pavement

Summary for Subcatchment 5S: Infiltration BMP 2A

Contributing Area: From Sta. 2025+03 to Sta. 2028+82

Runoff = 1.38 cfs @ 12.07 hrs, Volume= 0.107 af, Depth> 3.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=3.91"

Area (sf)	CN	Description
15,259	98	Paved parking, HSG C
15,259		100.00% Impervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	Direct Entry, NH 12 pavement				

Summary for Subcatchment 7S: Infiltration BMP 2B

Contributing Area: From Sta. 2028+82 to Sta. 2039+00

Runoff = 3.69 cfs @ 12.07 hrs, Volume= 0.286 af, Depth> 3.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=3.91"

Area (sf)	CN	Description
40,720	98	Paved parking, HSG C
40,720		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	Direct Entry, NH 12 pavement				

Summary for Subcatchment 9S: Infiltration BMP 3A

Contributing Area: From Sta. 2049+00 to Sta. 2060+49

Runoff = 4.12 cfs @ 12.07 hrs, Volume= 0.319 af, Depth> 3.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=3.91"

Area (sf)	CN	Description
45,436	98	Paved parking, HSG C
45,436		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	Direct Entry, NH 12 pavement				

Summary for Subcatchment 11S: Infiltration BMP 3B

Contributing Area: From Sta. 2060+49 to Sta. 2062+00

Runoff = 0.53 cfs @ 12.07 hrs, Volume= 0.041 af, Depth> 3.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=3.91"

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Type III 24-hr 10 Year Rainfall=3.91"

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Area (sf)	CN	Description			
5,889	98	Paved parking, HSG C			
5,889		100.00% Impervious Area			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, NH 12 pavement

Summary for Subcatchment 13S: Infiltration BMP 4A

Contributing Area: From Sta. 2073+50 to Sta. 2089+00

Runoff = 5.48 cfs @ 12.07 hrs, Volume= 0.425 af, Depth> 3.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=3.91"

Area (sf)	CN	Description			
60,450	98	Paved parking, HSG C			
60,450		100.00% Impervious Area			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, NH 12 pavement

Summary for Subcatchment 15S: Infiltration BMP 5A

Contributing Area: From Sta. 2091+60 to Sta. 2099+10

Runoff = 2.69 cfs @ 12.07 hrs, Volume= 0.209 af, Depth> 3.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=3.91"

Area (sf)	CN	Description			
29,721	98	Paved parking, HSG C			
29,721		100.00% Impervious Area			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, NH 12 pavement

Summary for Subcatchment 17S: Infiltration BMP 5B

Contributing Area: From Sta. 2099+10 to Sta. 2108+69

Runoff = 3.47 cfs @ 12.07 hrs, Volume= 0.269 af, Depth> 3.67"

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Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 Year Rainfall=3.91"

Area (sf)	CN	Description			
38,320	98	Paved parking, HSG C			
38,320		100.00% Impervious Area			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, NH 12 pavement

Summary for Subcatchment 19S: Infiltration BMP 5C

Contributing Area: From Sta. 2108+69 to Sta. 2121+61

Runoff = 4.69 cfs @ 12.07 hrs, Volume= 0.363 af, Depth> 3.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 Year Rainfall=3.91"

Area (sf)	CN	Description			
51,720	98	Paved parking, HSG C			
51,720		100.00% Impervious Area			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, NH 12 pavement

Summary for Subcatchment 21S: Infiltration BMP 5D

Contributing Area: From Sta. 2121+61 to Sta. 2130+00

Runoff = 3.00 cfs @ 12.07 hrs, Volume= 0.232 af, Depth> 3.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 Year Rainfall=3.91"

Area (sf)	CN	Description			
33,060	98	Paved parking, HSG C			
33,060		100.00% Impervious Area			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, NH 12 pavement

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Summary for Pond 2P: BMP 1A (Sta 2013+18 - DN 103)

Inflow Area = 0.758 ac, 100.00% Impervious, Inflow Depth > 3.67" for 10 Year event
 Inflow = 2.99 cfs @ 12.07 hrs, Volume= 0.232 af
 Outflow = 2.18 cfs @ 12.14 hrs, Volume= 0.232 af, Atten= 27%, Lag= 4.1 min
 Primary = 2.18 cfs @ 12.14 hrs, Volume= 0.232 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 317.17' @ 12.14 hrs Surf.Area= 0 sf Storage= 275 cf
 Flood Elev= 318.10' Surf.Area= 0 sf Storage= 4,368 cf

Plug-Flow detention time= 0.5 min calculated for 0.232 af (100% of inflow)
 Center-of-Mass det. time= 0.4 min (751.5 - 751.0)

Volume	Invert	Avail.Storage	Storage Description
#1	317.10'	4,368 cf	Custom Stage Data Listed below 14,560 cf Overall x 30.0% Voids

Elevation (feet)	Cum.Store (cubic-feet)
317.10	0
317.60	6,272
318.10	14,560

Device	Routing	Invert	Outlet Devices
#1	Primary	313.00'	15.0" Round Culvert L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 311.50' S= 0.0300 '/' Cc= 0.900 n= 0.012
#2	Device 1	314.25'	0.3" Horiz. Orifice/Grate X 540.00 C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.18 cfs @ 12.14 hrs HW=317.17' (Free Discharge)

↑ 1=Culvert (Passes 2.18 cfs of 8.79 cfs potential flow)
 ↑ 2=Orifice/Grate (Orifice Controls 2.18 cfs @ 8.23 fps)

Summary for Pond 4P: BMP 1B (Sta 2022+54.5 - DN B1)

Inflow Area = 0.196 ac, 100.00% Impervious, Inflow Depth > 3.67" for 10 Year event
 Inflow = 0.77 cfs @ 12.07 hrs, Volume= 0.060 af
 Outflow = 0.77 cfs @ 12.07 hrs, Volume= 0.060 af, Atten= 0%, Lag= 0.2 min
 Primary = 0.77 cfs @ 12.07 hrs, Volume= 0.060 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 319.52' @ 12.07 hrs Surf.Area= 0 sf Storage= 9 cf
 Flood Elev= 320.52' Surf.Area= 0 sf Storage= 2,401 cf

Plug-Flow detention time= 0.2 min calculated for 0.060 af (100% of inflow)
 Center-of-Mass det. time= 0.2 min (751.2 - 751.0)

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Volume	Invert	Avail.Storage	Storage Description
#1	319.52'	2,401 cf	Custom Stage Data Listed below 8,004 cf Overall x 30.0% Voids

Elevation (feet)	Cum.Store (cubic-feet)
319.52	0
320.02	3,884
320.52	8,004

Device	Routing	Invert	Outlet Devices
#1	Primary	316.95'	12.0" Round Culvert L= 42.0' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 316.50' S= 0.0107 '/' Cc= 0.900 n= 0.012
#2	Device 1	317.45'	0.3" Horiz. Orifice/Grate X 612.00 C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.08 cfs @ 12.07 hrs HW=319.52' (Free Discharge)

↑1=Culvert (Passes 2.08 cfs of 4.30 cfs potential flow)

↑2=Orifice/Grate (Orifice Controls 2.08 cfs @ 6.93 fps)

Summary for Pond 6P: BMP 2A (Sta 2025+05 - DN 112)

Inflow Area =	0.350 ac, 100.00% Impervious, Inflow Depth > 3.67" for 10 Year event
Inflow =	1.38 cfs @ 12.07 hrs, Volume= 0.107 af
Outflow =	1.10 cfs @ 12.13 hrs, Volume= 0.107 af, Atten= 20%, Lag= 3.4 min
Primary =	1.10 cfs @ 12.13 hrs, Volume= 0.107 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 321.10' @ 12.13 hrs Surf.Area= 0 sf Storage= 89 cf

Flood Elev= 322.02' Surf.Area= 0 sf Storage= 1,478 cf

Plug-Flow detention time= 0.3 min calculated for 0.107 af (100% of inflow)

Center-of-Mass det. time= 0.3 min (751.3 - 751.0)

Volume	Invert	Avail.Storage	Storage Description
#1	321.02'	1,478 cf	Custom Stage Data Listed below 4,926 cf Overall x 30.0% Voids

Elevation (feet)	Cum.Store (cubic-feet)
321.02	0
321.52	1,954
322.02	4,926

Device	Routing	Invert	Outlet Devices
#1	Primary	319.00'	15.0" Round Culvert L= 46.0' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 318.00' S= 0.0217 '/' Cc= 0.900 n= 0.012
#2	Device 1	320.35'	0.3" Horiz. Orifice/Grate X 540.00 C= 0.600 Limited to weir flow at low heads

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Primary OutFlow Max=1.10 cfs @ 12.13 hrs HW=321.10' (Free Discharge)

↑
1=Culvert (Passes 1.10 cfs of 5.66 cfs potential flow)
↑
2=Orifice/Grate (Orifice Controls 1.10 cfs @ 4.16 fps)

Summary for Pond 8P: BMP 2B (Sta 2033+31 - DN 118)

Inflow Area =	0.935 ac, 100.00% Impervious, Inflow Depth > 3.67" for 10 Year event
Inflow =	3.69 cfs @ 12.07 hrs, Volume= 0.286 af
Outflow =	2.04 cfs @ 12.18 hrs, Volume= 0.286 af, Atten= 45%, Lag= 6.4 min
Primary =	2.04 cfs @ 12.18 hrs, Volume= 0.286 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 321.92' @ 12.18 hrs Surf.Area= 0 sf Storage= 732 cf

Flood Elev= 322.70' Surf.Area= 0 sf Storage= 4,061 cf

Plug-Flow detention time= 1.2 min calculated for 0.286 af (100% of inflow)
Center-of-Mass det. time= 1.2 min (752.2 - 751.0)

Volume	Invert	Avail.Storage	Storage Description
#1	321.70'	4,061 cf	Custom Stage Data Listed below 13,536 cf Overall x 30.0% Voids

Elevation (feet)	Cum.Store (cubic-feet)
321.70	0
322.20	5,620
322.70	13,536

Device	Routing	Invert	Outlet Devices
#1	Primary	318.75'	15.0" Round Culvert L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 317.00' S= 0.0350 '/' Cc= 0.900 n= 0.012
#2	Device 1	319.37'	0.3" Horiz. Orifice/Grate X 540.00 C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.04 cfs @ 12.18 hrs HW=321.92' (Free Discharge)

↑
1=Culvert (Passes 2.04 cfs of 7.44 cfs potential flow)
↑
2=Orifice/Grate (Orifice Controls 2.04 cfs @ 7.68 fps)

Summary for Pond 10P: BMP 3A (Sta 2053+00 - DN 131)

Inflow Area =	1.043 ac, 100.00% Impervious, Inflow Depth > 3.67" for 10 Year event
Inflow =	4.12 cfs @ 12.07 hrs, Volume= 0.319 af
Outflow =	2.15 cfs @ 12.19 hrs, Volume= 0.319 af, Atten= 48%, Lag= 7.0 min
Primary =	2.15 cfs @ 12.19 hrs, Volume= 0.319 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 324.48' @ 12.19 hrs Surf.Area= 0 sf Storage= 912 cf

Flood Elev= 325.31' Surf.Area= 0 sf Storage= 6,479 cf

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Plug-Flow detention time= 1.6 min calculated for 0.319 af (100% of inflow)
 Center-of-Mass det. time= 1.5 min (752.5 - 751.0)

Volume	Invert	Avail.Storage	Storage Description
#1	324.31'	6,479 cf	Custom Stage Data Listed below 21,596 cf Overall x 30.0% Voids

Elevation (feet)	Cum.Store (cubic-feet)
324.31	0
324.81	9,136
325.31	21,596

Device	Routing	Invert	Outlet Devices
#1	Primary	321.00'	15.0" Round Culvert L= 49.0' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 320.00' S= 0.0204 '/' Cc= 0.900 n= 0.012
#2	Device 1	321.63'	0.3" Horiz. Orifice/Grate X 540.00 C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.15 cfs @ 12.19 hrs HW=324.48' (Free Discharge)

↑ 1=Culvert (Passes 2.15 cfs of 7.88 cfs potential flow)
 ↑ 2=Orifice/Grate (Orifice Controls 2.15 cfs @ 8.12 fps)

Summary for Pond 12P: BMP 3B (Sta 2061+98.5 - DN B2)

Inflow Area = 0.135 ac, 100.00% Impervious, Inflow Depth > 3.67" for 10 Year event
 Inflow = 0.53 cfs @ 12.07 hrs, Volume= 0.041 af
 Outflow = 0.39 cfs @ 12.14 hrs, Volume= 0.041 af, Atten= 28%, Lag= 4.2 min
 Primary = 0.39 cfs @ 12.14 hrs, Volume= 0.041 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 326.72' @ 12.14 hrs Surf.Area= 0 sf Storage= 92 cf
 Flood Elev= 327.67' Surf.Area= 0 sf Storage= 1,810 cf

Plug-Flow detention time= 1.6 min calculated for 0.041 af (100% of inflow)
 Center-of-Mass det. time= 1.5 min (752.5 - 751.0)

Volume	Invert	Avail.Storage	Storage Description
#1	326.67'	1,810 cf	Custom Stage Data Listed below 6,032 cf Overall x 30.0% Voids

Elevation (feet)	Cum.Store (cubic-feet)
326.67	0
327.17	3,016
327.67	6,032

Device	Routing	Invert	Outlet Devices
#1	Primary	324.65'	12.0" Round Culvert L= 40.0' CPP, projecting, no headwall, Ke= 0.900

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#2 Device 1 326.65' Outlet Invert= 324.45' S= 0.0050 '/' Cc= 0.900 n= 0.012
0.3" Horiz. Orifice/Grate X 612.00 C= 0.600
 Limited to weir flow at low heads

Primary OutFlow Max=0.39 cfs @ 12.14 hrs HW=326.72' (Free Discharge)

↑**1=Culvert** (Passes 0.39 cfs of 3.74 cfs potential flow)
 ↑**2=Orifice/Grate** (Orifice Controls 0.39 cfs @ 1.28 fps)

Summary for Pond 14P: BMP 4A (Sta 2086+80 - DN B3)

Inflow Area = 1.388 ac, 100.00% Impervious, Inflow Depth > 3.67" for 10 Year event
 Inflow = 5.48 cfs @ 12.07 hrs, Volume= 0.425 af
 Outflow = 1.98 cfs @ 12.30 hrs, Volume= 0.425 af, Atten= 64%, Lag= 13.9 min
 Primary = 1.98 cfs @ 12.30 hrs, Volume= 0.425 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 294.77' @ 12.30 hrs Surf.Area= 0 sf Storage= 2,334 cf

Flood Elev= 295.32' Surf.Area= 0 sf Storage= 5,976 cf

Plug-Flow detention time= 5.0 min calculated for 0.425 af (100% of inflow)
 Center-of-Mass det. time= 5.0 min (756.0 - 751.0)

Volume	Invert	Avail.Storage	Storage Description
#1	294.32'	5,976 cf	Custom Stage Data Listed below 19,920 cf Overall x 30.0% Voids

Elevation (feet)	Cum.Store (cubic-feet)
294.32	0
294.82	8,648
295.32	19,920

Device	Routing	Invert	Outlet Devices
#1	Primary	292.40'	12.0" Round Culvert L= 47.0' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 291.90' S= 0.0106 '/' Cc= 0.900 n= 0.012
#2	Device 1	292.90'	0.3" Horiz. Orifice/Grate X 612.00 C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.98 cfs @ 12.30 hrs HW=294.77' (Free Discharge)

↑**1=Culvert** (Passes 1.98 cfs of 4.08 cfs potential flow)
 ↑**2=Orifice/Grate** (Orifice Controls 1.98 cfs @ 6.58 fps)

Summary for Pond 16P: BMP 5A (Sta 2091+61.5 - DN B4)

Inflow Area = 0.682 ac, 100.00% Impervious, Inflow Depth > 3.67" for 10 Year event
 Inflow = 2.69 cfs @ 12.07 hrs, Volume= 0.209 af
 Outflow = 1.87 cfs @ 12.14 hrs, Volume= 0.209 af, Atten= 31%, Lag= 4.5 min
 Primary = 1.87 cfs @ 12.14 hrs, Volume= 0.209 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs

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Peak Elev= 295.97' @ 12.14 hrs Surf.Area= 0 sf Storage= 297 cf
 Flood Elev= 296.84' Surf.Area= 0 sf Storage= 3,180 cf

Plug-Flow detention time= 0.5 min calculated for 0.209 af (100% of inflow)
 Center-of-Mass det. time= 0.5 min (751.5 - 751.0)

Volume	Invert	Avail.Storage	Storage Description
#1	295.84'	3,180 cf	Custom Stage Data Listed below 10,600 cf Overall x 30.0% Voids

Elevation (feet)	Cum.Store (cubic-feet)
295.84	0
296.34	3,952
296.84	10,600

Device	Routing	Invert	Outlet Devices
#1	Primary	293.80'	12.0" Round Culvert L= 51.0' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 293.30' S= 0.0098 '/' Cc= 0.900 n= 0.012
#2	Device 1	294.30'	0.3" Horiz. Orifice/Grate X 612.00 C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.87 cfs @ 12.14 hrs HW=295.97' (Free Discharge)

1=Culvert (Passes 1.87 cfs of 3.85 cfs potential flow)
 2=Orifice/Grate (Orifice Controls 1.87 cfs @ 6.21 fps)

Summary for Pond 18P: BMP 5B (Sta 2103+90 - DN 153)

Inflow Area = 0.880 ac, 100.00% Impervious, Inflow Depth > 3.67" for 10 Year event
 Inflow = 3.47 cfs @ 12.07 hrs, Volume= 0.269 af
 Outflow = 1.71 cfs @ 12.20 hrs, Volume= 0.269 af, Atten= 51%, Lag= 7.8 min
 Primary = 1.71 cfs @ 12.20 hrs, Volume= 0.269 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 297.41' @ 12.20 hrs Surf.Area= 0 sf Storage= 878 cf
 Flood Elev= 298.29' Surf.Area= 0 sf Storage= 9,102 cf

Plug-Flow detention time= 2.1 min calculated for 0.269 af (100% of inflow)
 Center-of-Mass det. time= 2.1 min (753.1 - 751.0)

Volume	Invert	Avail.Storage	Storage Description
#1	297.29'	9,102 cf	Custom Stage Data Listed below 30,340 cf Overall x 30.0% Voids

Elevation (feet)	Cum.Store (cubic-feet)
297.29	0
297.79	11,924
298.29	30,340

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Device	Routing	Invert	Outlet Devices
#1	Primary	294.00'	15.0" Round Culvert L= 38.0' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 293.50' S= 0.0132 '/' Cc= 0.900 n= 0.012
#2	Device 1	294.62'	0.3" Horiz. Orifice/Grate X 432.00 C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.71 cfs @ 12.20 hrs HW=297.41' (Free Discharge)

↑ 1=Culvert (Passes 1.71 cfs of 7.79 cfs potential flow)
 ↑ 2=Orifice/Grate (Orifice Controls 1.71 cfs @ 8.05 fps)

Summary for Pond 20P: BMP 5C (Sta 2114+40 - DN 160)

Inflow Area = 1.187 ac, 100.00% Impervious, Inflow Depth > 3.67" for 10 Year event
 Inflow = 4.69 cfs @ 12.07 hrs, Volume= 0.363 af
 Outflow = 1.75 cfs @ 12.29 hrs, Volume= 0.363 af, Atten= 63%, Lag= 13.1 min
 Primary = 1.75 cfs @ 12.29 hrs, Volume= 0.363 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs / 3
 Peak Elev= 296.55' @ 12.29 hrs Surf.Area= 0 sf Storage= 1,821 cf
 Flood Elev= 297.21' Surf.Area= 0 sf Storage= 6,582 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 4.2 min (755.2 - 751.0)

Volume	Invert	Avail.Storage	Storage Description
#1	296.21'	6,582 cf	Custom Stage Data Listed below 21,940 cf Overall x 30.0% Voids

Elevation (feet)	Cum.Store (cubic-feet)
296.21	0
296.71	8,948
297.21	21,940

Device	Routing	Invert	Outlet Devices
#1	Primary	293.00'	15.0" Round Culvert L= 39.0' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 292.50' S= 0.0128 '/' Cc= 0.900 n= 0.012
#2	Device 1	293.62'	0.3" Horiz. Orifice/Grate X 432.00 C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.75 cfs @ 12.29 hrs HW=296.55' (Free Discharge)

↑ 1=Culvert (Passes 1.75 cfs of 7.98 cfs potential flow)
 ↑ 2=Orifice/Grate (Orifice Controls 1.75 cfs @ 8.24 fps)

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Type III 24-hr 10 Year Rainfall=3.91"

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Summary for Pond 22P: BMP 5D (Sta 2128+24 - DN 168)

Inflow Area = 0.759 ac, 100.00% Impervious, Inflow Depth > 3.67" for 10 Year event
 Inflow = 3.00 cfs @ 12.07 hrs, Volume= 0.232 af
 Outflow = 1.33 cfs @ 12.23 hrs, Volume= 0.232 af, Atten= 56%, Lag= 9.4 min
 Primary = 1.33 cfs @ 12.23 hrs, Volume= 0.232 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 296.56' @ 12.23 hrs Surf.Area= 0 sf Storage= 903 cf
 Flood Elev= 297.36' Surf.Area= 0 sf Storage= 5,117 cf

Plug-Flow detention time= 2.8 min calculated for 0.232 af (100% of inflow)
 Center-of-Mass det. time= 2.7 min (753.7 - 751.0)

Volume	Invert	Avail.Storage	Storage Description
#1	296.36'	5,117 cf	Custom Stage Data Listed below 17,056 cf Overall x 30.0% Voids

Elevation (feet)	Cum.Store (cubic-feet)
296.36	0
296.86	7,528
297.36	17,056

Device	Routing	Invert	Outlet Devices
#1	Primary	294.25'	15.0" Round Culvert L= 34.0' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 294.00' S= 0.0074 '/' Cc= 0.900 n= 0.012
#2	Device 1	294.87'	0.3" Horiz. Orifice/Grate X 432.00 C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.33 cfs @ 12.23 hrs HW=296.56' (Free Discharge)

↑1=Culvert (Passes 1.33 cfs of 6.06 cfs potential flow)
 ↑2=Orifice/Grate (Orifice Controls 1.33 cfs @ 6.26 fps)

Time span=1.00-24.00 hrs, dt=0.01 hrs, 2301 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Infiltration BMP 1A	Runoff Area=33,000 sf 100.00% Impervious Runoff Depth>5.40" Tc=5.0 min CN=98 Runoff=4.34 cfs 0.341 af
Subcatchment 3S: Infiltration BMP 1B	Runoff Area=8,538 sf 100.00% Impervious Runoff Depth>5.40" Tc=5.0 min CN=98 Runoff=1.12 cfs 0.088 af
Subcatchment 5S: Infiltration BMP 2A	Runoff Area=15,259 sf 100.00% Impervious Runoff Depth>5.40" Tc=5.0 min CN=98 Runoff=2.00 cfs 0.158 af
Subcatchment 7S: Infiltration BMP 2B	Runoff Area=40,720 sf 100.00% Impervious Runoff Depth>5.40" Tc=5.0 min CN=98 Runoff=5.35 cfs 0.421 af
Subcatchment 9S: Infiltration BMP 3A	Runoff Area=45,436 sf 100.00% Impervious Runoff Depth>5.40" Tc=5.0 min CN=98 Runoff=5.97 cfs 0.469 af
Subcatchment 11S: Infiltration BMP 3B	Runoff Area=5,889 sf 100.00% Impervious Runoff Depth>5.40" Tc=5.0 min CN=98 Runoff=0.77 cfs 0.061 af
Subcatchment 13S: Infiltration BMP 4A	Runoff Area=60,450 sf 100.00% Impervious Runoff Depth>5.40" Tc=5.0 min CN=98 Runoff=7.94 cfs 0.624 af
Subcatchment 15S: Infiltration BMP 5A	Runoff Area=29,721 sf 100.00% Impervious Runoff Depth>5.40" Tc=5.0 min CN=98 Runoff=3.90 cfs 0.307 af
Subcatchment 17S: Infiltration BMP 5B	Runoff Area=38,320 sf 100.00% Impervious Runoff Depth>5.40" Tc=5.0 min CN=98 Runoff=5.03 cfs 0.396 af
Subcatchment 19S: Infiltration BMP 5C	Runoff Area=51,720 sf 100.00% Impervious Runoff Depth>5.40" Tc=5.0 min CN=98 Runoff=6.79 cfs 0.534 af
Subcatchment 21S: Infiltration BMP 5D	Runoff Area=33,060 sf 100.00% Impervious Runoff Depth>5.40" Tc=5.0 min CN=98 Runoff=4.34 cfs 0.341 af
Pond 2P: BMP 1A (Sta 2013+18 - DN 103)	Peak Elev=317.36' Storage=965 cf Inflow=4.34 cfs 0.341 af Outflow=2.25 cfs 0.341 af
Pond 4P: BMP 1B (Sta 2022+54.5 - DN B1)	Peak Elev=319.53' Storage=13 cf Inflow=1.12 cfs 0.088 af Outflow=1.12 cfs 0.088 af
Pond 6P: BMP 2A (Sta 2025+05 - DN 112)	Peak Elev=321.31' Storage=339 cf Inflow=2.00 cfs 0.158 af Outflow=1.25 cfs 0.158 af
Pond 8P: BMP 2B (Sta 2033+31 - DN 118)	Peak Elev=322.24' Storage=1,868 cf Inflow=5.35 cfs 0.421 af Outflow=2.16 cfs 0.421 af
Pond 10P: BMP 3A (Sta 2053+00 - DN 131)	Peak Elev=324.73' Storage=2,292 cf Inflow=5.97 cfs 0.469 af Outflow=2.25 cfs 0.469 af

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Type III 24-hr 50 Year Rainfall=5.64"

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Pond 12P: BMP 3B (Sta 2061+98.5 - DN B2)	Peak Elev=326.77' Storage=185 cf Inflow=0.77 cfs 0.061 af Outflow=0.51 cfs 0.061 af
Pond 14P: BMP 4A (Sta 2086+80 - DN B3)	Peak Elev=295.16' Storage=4,910 cf Inflow=7.94 cfs 0.624 af Outflow=2.18 cfs 0.624 af
Pond 16P: BMP 5A (Sta 2091+61.5 - DN B4)	Peak Elev=296.23' Storage=922 cf Inflow=3.90 cfs 0.307 af Outflow=2.01 cfs 0.307 af
Pond 18P: BMP 5B (Sta 2103+90 - DN 153)	Peak Elev=297.59' Storage=2,148 cf Inflow=5.03 cfs 0.396 af Outflow=1.76 cfs 0.396 af
Pond 20P: BMP 5C (Sta 2114+40 - DN 160)	Peak Elev=296.88' Storage=4,040 cf Inflow=6.79 cfs 0.534 af Outflow=1.84 cfs 0.534 af
Pond 22P: BMP 5D (Sta 2128+24 - DN 168)	Peak Elev=296.83' Storage=2,101 cf Inflow=4.34 cfs 0.341 af Outflow=1.43 cfs 0.341 af

Total Runoff Area = 8.313 ac Runoff Volume = 3.740 af Average Runoff Depth = 5.40"
0.00% Pervious = 0.000 ac 100.00% Impervious = 8.313 ac

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Type III 24-hr 50 Year Rainfall=5.64"

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Summary for Subcatchment 1S: Infiltration BMP 1A

Contributing Area: From Sta. 2012+25 to Sta. 2020+50

Runoff = 4.34 cfs @ 12.07 hrs, Volume= 0.341 af, Depth> 5.40"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=5.64"

Area (sf)	CN	Description
33,000	98	Paved parking, HSG C
33,000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, NH 12 pavement

Summary for Subcatchment 3S: Infiltration BMP 1B

Contributing Area: From Sta. 2020+50 to Sta. 2022+56

Runoff = 1.12 cfs @ 12.07 hrs, Volume= 0.088 af, Depth> 5.40"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=5.64"

Area (sf)	CN	Description
8,538	98	Paved parking, HSG C
8,538		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, NH 12 pavement

Summary for Subcatchment 5S: Infiltration BMP 2A

Contributing Area: From Sta. 2025+03 to Sta. 2028+82

Runoff = 2.00 cfs @ 12.07 hrs, Volume= 0.158 af, Depth> 5.40"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=5.64"

Area (sf)	CN	Description
15,259	98	Paved parking, HSG C
15,259		100.00% Impervious Area

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Type III 24-hr 50 Year Rainfall=5.64"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	Direct Entry, NH 12 pavement				

Summary for Subcatchment 7S: Infiltration BMP 2B

Contributing Area: From Sta. 2028+82 to Sta. 2039+00

Runoff = 5.35 cfs @ 12.07 hrs, Volume= 0.421 af, Depth> 5.40"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=5.64"

Area (sf)	CN	Description
40,720	98	Paved parking, HSG C
40,720		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	Direct Entry, NH 12 pavement				

Summary for Subcatchment 9S: Infiltration BMP 3A

Contributing Area: From Sta. 2049+00 to Sta. 2060+49

Runoff = 5.97 cfs @ 12.07 hrs, Volume= 0.469 af, Depth> 5.40"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=5.64"

Area (sf)	CN	Description
45,436	98	Paved parking, HSG C
45,436		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	Direct Entry, NH 12 pavement				

Summary for Subcatchment 11S: Infiltration BMP 3B

Contributing Area: From Sta. 2060+49 to Sta. 2062+00

Runoff = 0.77 cfs @ 12.07 hrs, Volume= 0.061 af, Depth> 5.40"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=5.64"

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Type III 24-hr 50 Year Rainfall=5.64"

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Area (sf)	CN	Description			
5,889	98	Paved parking, HSG C			
5,889		100.00% Impervious Area			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, NH 12 pavement

Summary for Subcatchment 13S: Infiltration BMP 4A

Contributing Area: From Sta. 2073+50 to Sta. 2089+00

Runoff = 7.94 cfs @ 12.07 hrs, Volume= 0.624 af, Depth> 5.40"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=5.64"

Area (sf)	CN	Description			
60,450	98	Paved parking, HSG C			
60,450		100.00% Impervious Area			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, NH 12 pavement

Summary for Subcatchment 15S: Infiltration BMP 5A

Contributing Area: From Sta. 2091+60 to Sta. 2099+10

Runoff = 3.90 cfs @ 12.07 hrs, Volume= 0.307 af, Depth> 5.40"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=5.64"

Area (sf)	CN	Description			
29,721	98	Paved parking, HSG C			
29,721		100.00% Impervious Area			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, NH 12 pavement

Summary for Subcatchment 17S: Infiltration BMP 5B

Contributing Area: From Sta. 2099+10 to Sta. 2108+69

Runoff = 5.03 cfs @ 12.07 hrs, Volume= 0.396 af, Depth> 5.40"

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Type III 24-hr 50 Year Rainfall=5.64"

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Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50 Year Rainfall=5.64"

Area (sf)	CN	Description			
38,320	98	Paved parking, HSG C			
38,320		100.00% Impervious Area			
Tc	Length	Slope	Velocity	Capacity	Description
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
5.0					Direct Entry, NH 12 pavement

Summary for Subcatchment 19S: Infiltration BMP 5C

Contributing Area: From Sta. 2108+69 to Sta. 2121+61

Runoff = 6.79 cfs @ 12.07 hrs, Volume= 0.534 af, Depth> 5.40"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50 Year Rainfall=5.64"

Area (sf)	CN	Description			
51,720	98	Paved parking, HSG C			
51,720		100.00% Impervious Area			
Tc	Length	Slope	Velocity	Capacity	Description
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
5.0					Direct Entry, NH 12 pavement

Summary for Subcatchment 21S: Infiltration BMP 5D

Contributing Area: From Sta. 2121+61 to Sta. 2130+00

Runoff = 4.34 cfs @ 12.07 hrs, Volume= 0.341 af, Depth> 5.40"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50 Year Rainfall=5.64"

Area (sf)	CN	Description			
33,060	98	Paved parking, HSG C			
33,060		100.00% Impervious Area			
Tc	Length	Slope	Velocity	Capacity	Description
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
5.0					Direct Entry, NH 12 pavement

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Type III 24-hr 50 Year Rainfall=5.64"

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Summary for Pond 2P: BMP 1A (Sta 2013+18 - DN 103)

Inflow Area = 0.758 ac, 100.00% Impervious, Inflow Depth > 5.40" for 50 Year event
 Inflow = 4.34 cfs @ 12.07 hrs, Volume= 0.341 af
 Outflow = 2.25 cfs @ 12.19 hrs, Volume= 0.341 af, Atten= 48%, Lag= 7.1 min
 Primary = 2.25 cfs @ 12.19 hrs, Volume= 0.341 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 317.36' @ 12.19 hrs Surf.Area= 0 sf Storage= 965 cf
 Flood Elev= 318.10' Surf.Area= 0 sf Storage= 4,368 cf

Plug-Flow detention time= 1.5 min calculated for 0.341 af (100% of inflow)
 Center-of-Mass det. time= 1.4 min (746.2 - 744.8)

Volume	Invert	Avail.Storage	Storage Description
#1	317.10'	4,368 cf	Custom Stage Data Listed below 14,560 cf Overall x 30.0% Voids

Elevation (feet)	Cum.Store (cubic-feet)
317.10	0
317.60	6,272
318.10	14,560

Device	Routing	Invert	Outlet Devices
#1	Primary	313.00'	15.0" Round Culvert L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 311.50' S= 0.0300 '/' Cc= 0.900 n= 0.012
#2	Device 1	314.25'	0.3" Horiz. Orifice/Grate X 540.00 C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.25 cfs @ 12.19 hrs HW=317.36' (Free Discharge)

↑1=Culvert (Passes 2.25 cfs of 9.01 cfs potential flow)
 ↑2=Orifice/Grate (Orifice Controls 2.25 cfs @ 8.49 fps)

Summary for Pond 4P: BMP 1B (Sta 2022+54.5 - DN B1)

Inflow Area = 0.196 ac, 100.00% Impervious, Inflow Depth > 5.40" for 50 Year event
 Inflow = 1.12 cfs @ 12.07 hrs, Volume= 0.088 af
 Outflow = 1.12 cfs @ 12.07 hrs, Volume= 0.088 af, Atten= 0%, Lag= 0.2 min
 Primary = 1.12 cfs @ 12.07 hrs, Volume= 0.088 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 319.53' @ 12.07 hrs Surf.Area= 0 sf Storage= 13 cf
 Flood Elev= 320.52' Surf.Area= 0 sf Storage= 2,401 cf

Plug-Flow detention time= 0.2 min calculated for 0.088 af (100% of inflow)
 Center-of-Mass det. time= 0.2 min (744.9 - 744.8)

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Type III 24-hr 50 Year Rainfall=5.64"

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Volume	Invert	Avail.Storage	Storage Description
#1	319.52'	2,401 cf	Custom Stage Data Listed below 8,004 cf Overall x 30.0% Voids

Elevation (feet)	Cum.Store (cubic-feet)
319.52	0
320.02	3,884
320.52	8,004

Device	Routing	Invert	Outlet Devices
#1	Primary	316.95'	12.0" Round Culvert L= 42.0' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 316.50' S= 0.0107 '/' Cc= 0.900 n= 0.012
#2	Device 1	317.45'	0.3" Horiz. Orifice/Grate X 612.00 C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.08 cfs @ 12.07 hrs HW=319.53' (Free Discharge)

↑1=Culvert (Passes 2.08 cfs of 4.30 cfs potential flow)

↑2=Orifice/Grate (Orifice Controls 2.08 cfs @ 6.94 fps)

Summary for Pond 6P: BMP 2A (Sta 2025+05 - DN 112)

Inflow Area = 0.350 ac, 100.00% Impervious, Inflow Depth > 5.40" for 50 Year event
 Inflow = 2.00 cfs @ 12.07 hrs, Volume= 0.158 af
 Outflow = 1.25 cfs @ 12.16 hrs, Volume= 0.158 af, Atten= 38%, Lag= 5.3 min
 Primary = 1.25 cfs @ 12.16 hrs, Volume= 0.158 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 321.31' @ 12.16 hrs Surf.Area= 0 sf Storage= 339 cf

Flood Elev= 322.02' Surf.Area= 0 sf Storage= 1,478 cf

Plug-Flow detention time= 0.9 min calculated for 0.158 af (100% of inflow)

Center-of-Mass det. time= 0.8 min (745.6 - 744.8)

Volume	Invert	Avail.Storage	Storage Description
#1	321.02'	1,478 cf	Custom Stage Data Listed below 4,926 cf Overall x 30.0% Voids

Elevation (feet)	Cum.Store (cubic-feet)
321.02	0
321.52	1,954
322.02	4,926

Device	Routing	Invert	Outlet Devices
#1	Primary	319.00'	15.0" Round Culvert L= 46.0' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 318.00' S= 0.0217 '/' Cc= 0.900 n= 0.012
#2	Device 1	320.35'	0.3" Horiz. Orifice/Grate X 540.00 C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.25 cfs @ 12.16 hrs HW=321.31' (Free Discharge)

↑
1=Culvert (Passes 1.25 cfs of 6.05 cfs potential flow)
 ↑
2=Orifice/Grate (Orifice Controls 1.25 cfs @ 4.71 fps)

Summary for Pond 8P: BMP 2B (Sta 2033+31 - DN 118)

Inflow Area =	0.935 ac, 100.00% Impervious, Inflow Depth > 5.40"	for 50 Year event
Inflow =	5.35 cfs @ 12.07 hrs, Volume=	0.421 af
Outflow =	2.16 cfs @ 12.26 hrs, Volume=	0.421 af, Atten= 60%, Lag= 11.3 min
Primary =	2.16 cfs @ 12.26 hrs, Volume=	0.421 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 322.24' @ 12.26 hrs Surf.Area= 0 sf Storage= 1,868 cf

Flood Elev= 322.70' Surf.Area= 0 sf Storage= 4,061 cf

Plug-Flow detention time= 3.3 min calculated for 0.421 af (100% of inflow)
Center-of-Mass det. time= 3.3 min (748.1 - 744.8)

Volume	Invert	Avail.Storage	Storage Description
#1	321.70'	4,061 cf	Custom Stage Data Listed below 13,536 cf Overall x 30.0% Voids

Elevation (feet)	Cum.Store (cubic-feet)
321.70	0
322.20	5,620
322.70	13,536

Device	Routing	Invert	Outlet Devices
#1	Primary	318.75'	15.0" Round Culvert L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 317.00' S= 0.0350 '/' Cc= 0.900 n= 0.012
#2	Device 1	319.37'	0.3" Horiz. Orifice/Grate X 540.00 C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.16 cfs @ 12.26 hrs HW=322.24' (Free Discharge)

↑
1=Culvert (Passes 2.16 cfs of 7.89 cfs potential flow)
 ↑
2=Orifice/Grate (Orifice Controls 2.16 cfs @ 8.15 fps)

Summary for Pond 10P: BMP 3A (Sta 2053+00 - DN 131)

Inflow Area =	1.043 ac, 100.00% Impervious, Inflow Depth > 5.40"	for 50 Year event
Inflow =	5.97 cfs @ 12.07 hrs, Volume=	0.469 af
Outflow =	2.25 cfs @ 12.28 hrs, Volume=	0.469 af, Atten= 62%, Lag= 12.9 min
Primary =	2.25 cfs @ 12.28 hrs, Volume=	0.469 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 324.73' @ 12.28 hrs Surf.Area= 0 sf Storage= 2,292 cf

Flood Elev= 325.31' Surf.Area= 0 sf Storage= 6,479 cf

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Plug-Flow detention time= 4.1 min calculated for 0.469 af (100% of inflow)
 Center-of-Mass det. time= 4.0 min (748.8 - 744.8)

Volume	Invert	Avail.Storage	Storage Description
#1	324.31'	6,479 cf	Custom Stage Data Listed below 21,596 cf Overall x 30.0% Voids

Elevation (feet)	Cum.Store (cubic-feet)
324.31	0
324.81	9,136
325.31	21,596

Device	Routing	Invert	Outlet Devices
#1	Primary	321.00'	15.0" Round Culvert L= 49.0' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 320.00' S= 0.0204 '/' Cc= 0.900 n= 0.012
#2	Device 1	321.63'	0.3" Horiz. Orifice/Grate X 540.00 C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.25 cfs @ 12.28 hrs HW=324.73' (Free Discharge)

↑1=Culvert (Passes 2.25 cfs of 8.22 cfs potential flow)
 ↑2=Orifice/Grate (Orifice Controls 2.25 cfs @ 8.48 fps)

Summary for Pond 12P: BMP 3B (Sta 2061+98.5 - DN B2)

Inflow Area = 0.135 ac, 100.00% Impervious, Inflow Depth > 5.40" for 50 Year event
 Inflow = 0.77 cfs @ 12.07 hrs, Volume= 0.061 af
 Outflow = 0.51 cfs @ 12.15 hrs, Volume= 0.061 af, Atten= 35%, Lag= 4.9 min
 Primary = 0.51 cfs @ 12.15 hrs, Volume= 0.061 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 326.77' @ 12.15 hrs Surf.Area= 0 sf Storage= 185 cf
 Flood Elev= 327.67' Surf.Area= 0 sf Storage= 1,810 cf

Plug-Flow detention time= 2.2 min calculated for 0.061 af (100% of inflow)
 Center-of-Mass det. time= 2.1 min (746.9 - 744.8)

Volume	Invert	Avail.Storage	Storage Description
#1	326.67'	1,810 cf	Custom Stage Data Listed below 6,032 cf Overall x 30.0% Voids

Elevation (feet)	Cum.Store (cubic-feet)
326.67	0
327.17	3,016
327.67	6,032

Device	Routing	Invert	Outlet Devices
#1	Primary	324.65'	12.0" Round Culvert L= 40.0' CPP, projecting, no headwall, Ke= 0.900

14747 Infiltration BMPs

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Type III 24-hr 50 Year Rainfall=5.64"

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#2 Device 1 326.65' Outlet Invert= 324.45' S= 0.0050 '/' Cc= 0.900 n= 0.012
0.3" Horiz. Orifice/Grate X 612.00 C= 0.600
 Limited to weir flow at low heads

Primary OutFlow Max=0.51 cfs @ 12.15 hrs HW=326.77' (Free Discharge)

↑**1=Culvert** (Passes 0.51 cfs of 3.80 cfs potential flow)
 ↑**2=Orifice/Grate** (Orifice Controls 0.51 cfs @ 1.68 fps)

Summary for Pond 14P: BMP 4A (Sta 2086+80 - DN B3)

Inflow Area = 1.388 ac, 100.00% Impervious, Inflow Depth > 5.40" for 50 Year event
 Inflow = 7.94 cfs @ 12.07 hrs, Volume= 0.624 af
 Outflow = 2.18 cfs @ 12.40 hrs, Volume= 0.624 af, Atten= 73%, Lag= 19.7 min
 Primary = 2.18 cfs @ 12.40 hrs, Volume= 0.624 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 295.16' @ 12.40 hrs Surf.Area= 0 sf Storage= 4,910 cf

Flood Elev= 295.32' Surf.Area= 0 sf Storage= 5,976 cf

Plug-Flow detention time= 10.7 min calculated for 0.624 af (100% of inflow)
 Center-of-Mass det. time= 10.6 min (755.4 - 744.8)

Volume	Invert	Avail.Storage	Storage Description
#1	294.32'	5,976 cf	Custom Stage Data Listed below 19,920 cf Overall x 30.0% Voids

Elevation (feet)	Cum.Store (cubic-feet)
294.32	0
294.82	8,648
295.32	19,920

Device	Routing	Invert	Outlet Devices
#1	Primary	292.40'	12.0" Round Culvert L= 47.0' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 291.90' S= 0.0106 '/' Cc= 0.900 n= 0.012
#2	Device 1	292.90'	0.3" Horiz. Orifice/Grate X 612.00 C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.18 cfs @ 12.40 hrs HW=295.16' (Free Discharge)

↑**1=Culvert** (Passes 2.18 cfs of 4.49 cfs potential flow)
 ↑**2=Orifice/Grate** (Orifice Controls 2.18 cfs @ 7.24 fps)

Summary for Pond 16P: BMP 5A (Sta 2091+61.5 - DN B4)

Inflow Area = 0.682 ac, 100.00% Impervious, Inflow Depth > 5.40" for 50 Year event
 Inflow = 3.90 cfs @ 12.07 hrs, Volume= 0.307 af
 Outflow = 2.01 cfs @ 12.19 hrs, Volume= 0.307 af, Atten= 49%, Lag= 7.2 min
 Primary = 2.01 cfs @ 12.19 hrs, Volume= 0.307 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs

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Type III 24-hr 50 Year Rainfall=5.64"

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Peak Elev= 296.23' @ 12.19 hrs Surf.Area= 0 sf Storage= 922 cf
 Flood Elev= 296.84' Surf.Area= 0 sf Storage= 3,180 cf

Plug-Flow detention time= 1.6 min calculated for 0.307 af (100% of inflow)
 Center-of-Mass det. time= 1.5 min (746.3 - 744.8)

Volume	Invert	Avail.Storage	Storage Description
#1	295.84'	3,180 cf	Custom Stage Data Listed below 10,600 cf Overall x 30.0% Voids

Elevation (feet)	Cum.Store (cubic-feet)
295.84	0
296.34	3,952
296.84	10,600

Device	Routing	Invert	Outlet Devices
#1	Primary	293.80'	12.0" Round Culvert L= 51.0' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 293.30' S= 0.0098 '/' Cc= 0.900 n= 0.012
#2	Device 1	294.30'	0.3" Horiz. Orifice/Grate X 612.00 C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.01 cfs @ 12.19 hrs HW=296.23' (Free Discharge)

1=Culvert (Passes 2.01 cfs of 4.15 cfs potential flow)
 2=Orifice/Grate (Orifice Controls 2.01 cfs @ 6.69 fps)

Summary for Pond 18P: BMP 5B (Sta 2103+90 - DN 153)

Inflow Area = 0.880 ac, 100.00% Impervious, Inflow Depth > 5.40" for 50 Year event
 Inflow = 5.03 cfs @ 12.07 hrs, Volume= 0.396 af
 Outflow = 1.76 cfs @ 12.31 hrs, Volume= 0.396 af, Atten= 65%, Lag= 14.6 min
 Primary = 1.76 cfs @ 12.31 hrs, Volume= 0.396 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 297.59' @ 12.31 hrs Surf.Area= 0 sf Storage= 2,148 cf
 Flood Elev= 298.29' Surf.Area= 0 sf Storage= 9,102 cf

Plug-Flow detention time= 5.2 min calculated for 0.396 af (100% of inflow)
 Center-of-Mass det. time= 5.1 min (749.9 - 744.8)

Volume	Invert	Avail.Storage	Storage Description
#1	297.29'	9,102 cf	Custom Stage Data Listed below 30,340 cf Overall x 30.0% Voids

Elevation (feet)	Cum.Store (cubic-feet)
297.29	0
297.79	11,924
298.29	30,340

14747 Infiltration BMPs

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Type III 24-hr 50 Year Rainfall=5.64"

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Device	Routing	Invert	Outlet Devices
#1	Primary	294.00'	15.0" Round Culvert L= 38.0' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 293.50' S= 0.0132 '/' Cc= 0.900 n= 0.012
#2	Device 1	294.62'	0.3" Horiz. Orifice/Grate X 432.00 C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.76 cfs @ 12.31 hrs HW=297.59' (Free Discharge)

↑ 1=Culvert (Passes 1.76 cfs of 8.03 cfs potential flow)
 ↑ 2=Orifice/Grate (Orifice Controls 1.76 cfs @ 8.30 fps)

Summary for Pond 20P: BMP 5C (Sta 2114+40 - DN 160)

Inflow Area = 1.187 ac, 100.00% Impervious, Inflow Depth > 5.40" for 50 Year event
 Inflow = 6.79 cfs @ 12.07 hrs, Volume= 0.534 af
 Outflow = 1.84 cfs @ 12.40 hrs, Volume= 0.534 af, Atten= 73%, Lag= 19.9 min
 Primary = 1.84 cfs @ 12.40 hrs, Volume= 0.534 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs / 3

Peak Elev= 296.88' @ 12.40 hrs Surf.Area= 0 sf Storage= 4,040 cf

Flood Elev= 297.21' Surf.Area= 0 sf Storage= 6,582 cf

Plug-Flow detention time= 9.9 min calculated for 0.534 af (100% of inflow)

Center-of-Mass det. time= 9.9 min (754.6 - 744.8)

Volume	Invert	Avail.Storage	Storage Description
#1	296.21'	6,582 cf	Custom Stage Data Listed below 21,940 cf Overall x 30.0% Voids

Elevation (feet)	Cum.Store (cubic-feet)
296.21	0
296.71	8,948
297.21	21,940

Device	Routing	Invert	Outlet Devices
#1	Primary	293.00'	15.0" Round Culvert L= 39.0' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 292.50' S= 0.0128 '/' Cc= 0.900 n= 0.012
#2	Device 1	293.62'	0.3" Horiz. Orifice/Grate X 432.00 C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.84 cfs @ 12.40 hrs HW=296.88' (Free Discharge)

↑ 1=Culvert (Passes 1.84 cfs of 8.42 cfs potential flow)
 ↑ 2=Orifice/Grate (Orifice Controls 1.84 cfs @ 8.70 fps)

14747 Infiltration BMPs

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Type III 24-hr 50 Year Rainfall=5.64"

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Summary for Pond 22P: BMP 5D (Sta 2128+24 - DN 168)

Inflow Area = 0.759 ac, 100.00% Impervious, Inflow Depth > 5.40" for 50 Year event
 Inflow = 4.34 cfs @ 12.07 hrs, Volume= 0.341 af
 Outflow = 1.43 cfs @ 12.34 hrs, Volume= 0.341 af, Atten= 67%, Lag= 16.0 min
 Primary = 1.43 cfs @ 12.34 hrs, Volume= 0.341 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 296.83' @ 12.34 hrs Surf.Area= 0 sf Storage= 2,101 cf
 Flood Elev= 297.36' Surf.Area= 0 sf Storage= 5,117 cf

Plug-Flow detention time= 6.4 min calculated for 0.341 af (100% of inflow)
 Center-of-Mass det. time= 6.4 min (751.1 - 744.8)

Volume	Invert	Avail.Storage	Storage Description
#1	296.36'	5,117 cf	Custom Stage Data Listed below 17,056 cf Overall x 30.0% Voids

Elevation (feet)	Cum.Store (cubic-feet)
296.36	0
296.86	7,528
297.36	17,056

Device	Routing	Invert	Outlet Devices
#1	Primary	294.25'	15.0" Round Culvert L= 34.0' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 294.00' S= 0.0074 '/' Cc= 0.900 n= 0.012
#2	Device 1	294.87'	0.3" Horiz. Orifice/Grate X 432.00 C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.43 cfs @ 12.34 hrs HW=296.83' (Free Discharge)

↑1=Culvert (Passes 1.43 cfs of 6.51 cfs potential flow)
 ↑2=Orifice/Grate (Orifice Controls 1.43 cfs @ 6.73 fps)

New Hampshire Department of Transportation
Walpole-Charlestown, X-A000(487),14747
N.H. Route 12 Reconstruction

POLLUTANT LOADING ANALYSIS REPORT

APPENDIX 8:
MISCELLANEOUS INFILTRATION BMP CALCULATIONS



2 EXECUTIVE PARK DRIVE
BEDFORD, NH
603-666-7181

JOB NO. 14747 - Walpole/Charleston NH 12

SHEET NO. 1

OF 1

CALCULATED BY: JRB

DATE: 6/12/2017

CHECKED BY: RRP

DATE: 6/13/2017

Infiltration BMP Surface Area and Volume Calculations

Surface Area Calculations:

Infiltration BMP Area No.	From Station	To Station	Length (ft)	LT Shoulder (ft)	NH 12 Impervious Pavement			Area (sf)	Stone Panel			Total Area (sf)
					LT Travel Way (ft)	RT Travel Way (ft)	RT Shoulder (ft)		LT	RT	Area (sf)	
1A	2012+25	2020+50	825.0	5	11	11	5	26400	4	4	6600	33000
1B	2020+50	2021+51	101.0	5	11	11	5		4	4	1648	8537.5
	2021+51	2022+01	50.0	6	11	11	5		4	4		
	2022+01	2022+56	55.0	9.5	11	11	5		4	4		
2A	2025+03	2025+21	18.0	10.5	11	11	5	12227	4	4	3032	15259
	2025+21	2028+82	361.0	5	11	11	5		4	4		
2B	2028+82	2039+00	1018.0	5	11	11	5	32576	4	4	8144	40720
3A	2049+00	2055+00	600.0	5	11	11	5	36244	4	4	9192	45436
	2055+00	2055+50	50.0	4.5	11	11	5		4	4		
	2055+50	2060+49	499.0	4	11	11	5		4	4		
3B	2060+49	2062+00	151.0	4	11	11	5	4681	4	4	1208	5889
4A	2073+50	2089+00	1550.0	5	11	11	4	48050	4	4	12400	60450
5A	2091+60	2092+00	40.0	4	11	11	5.4	23721	4	4	6000	29721
	2092+00	2094+30	230.0	4	11	11	5		4	4		
	2094+30	2094+80	50.0	4.5	11	11	5		4	4		
	2094+80	2099+10	430.0	5	11	11	5		4	4		
5B	2099+10	2108+68	958.0	5	11	11	5	30656	4	4	7664	38320
5C	2108+68	2121+61	1293.0	5	11	11	5	41376	4	4	10344	51720
5D	2121+61	2123+10	149.0	5	11	11	5	26348	4	4	6712	33060
	2123+10	2123+60	50.0	4.5	11	11	5		4	4		
	2123+60	2128+10	450.0	4	11	11	5		4	4		
	2128+10	2128+60	50.0	4.5	11	11	5		4	4		
	2128+60	2130+00	140.0	5	11	11	5		4	4		

BMP Volume Calculations:

% voids in stone= 30

Infiltration BMP Area No.	Surface Area of BMP (sf) (See above)	Depth (ft)	BMP Volume ¹ (cf)	Bottom Station	Bottom elevation (at low point)
1A	33000	0.25	2475	2013+18	316.60
1B	8538	0.25	641	2022+54.5	319.02
2A	15259	0.25	1145	2025+05	320.52
2B	40720	0.25	3054	2033+31	321.20
3A	45436	0.25	3408	2053+00	323.81
3B	5889	0.25	442	2061+98.5	326.17
4A	60450	0.25	4534	2086+80	293.82
5A	29721	0.25	2230	2091+61.5	295.34
5B	38320	0.25	2874	2103+90	296.79
5C	51720	0.25	3879	2114+40	295.71
5D	33060	0.25	2480	2128+18	295.86

¹ This is the total volume of stormwater that is retained by the 6" tall dams.



2 EXECUTIVE PARK DRIVE
BEDFORD, NH
603-666-7181

JOB NO. 14747 - Walpole/Charleston NH 12
SHEET NO. 1 OF 1
CALCULATED BY: JRB DATE: 5/5/2017
CHECKED BY: RRP DATE: 5/8/2017

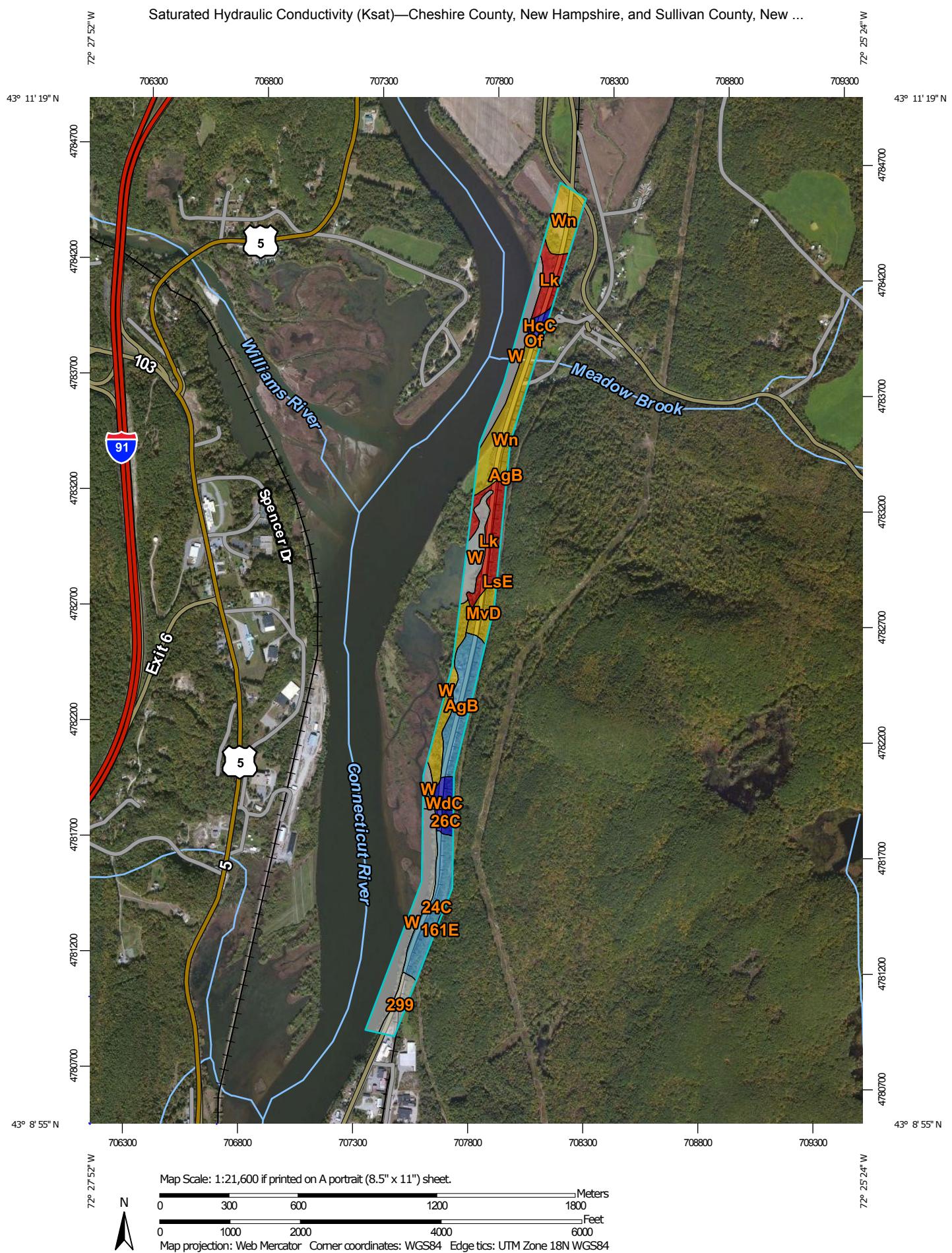
Determine Default Subgrade Infiltration Rates

Refer to NH Stormwater Manual, Volume 2, Chapter 2.4 for calculation guidelines

Ksat values were obtained from NRCS Soils Survey (online).

Infiltration BMP Area No.	Primary Soil Type	Ksat value (micrometer/sec)	Conversion factor to in/hr	Safety Factor	Default Infiltration Rate (in/hr)
1	Agawam	77.64	0.1417	0.5	5.6
2	Agawam	77.64	0.1417	0.5	5.6
3	Agawam	77.64	0.1417	0.5	5.6
4	Limerick	9.17	0.1417	0.5	0.7
5	Winooski	23.28	0.1417	0.5	1.7

Saturated Hydraulic Conductivity (Ksat)—Cheshire County, New Hampshire, and Sullivan County, New ...



Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

5/7/2017
Page 1 of 4

MAP LEGEND

Area of Interest (AOI)		Area of Interest (AOI)	Transportation		Rails
Soils		Soil Rating Polygons			Interstate Highways
		<= 9.1722			US Routes
		> 9.1722 and <= 23.2833			Major Roads
		> 23.2833 and <= 58.5455			Local Roads
		> 58.5455 and <= 77.6364			Background
		> 77.6364 and <= 100.0000			Aerial Photography
		Not rated or not available			
Soil Rating Lines		= 9.1722			
		> 9.1722 and <= 23.2833			
		> 23.2833 and <= 58.5455			
		> 58.5455 and <= 77.6364			
		> 77.6364 and <= 100.0000			
		Not rated or not available			
Soil Rating Points		= 9.1722			
		> 9.1722 and <= 23.2833			
		> 23.2833 and <= 58.5455			
		> 58.5455 and <= 77.6364			
		> 77.6364 and <= 100.0000			
		Not rated or not available			
Water Features		Streams and Canals			

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Cheshire County, New Hampshire
Survey Area Date: Version 19, Sep 15, 2016

Soil Survey Area: Sullivan County, New Hampshire
Survey Area Date: Version 21, Sep 15, 2016

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 10, 2011—Oct 8, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Saturated Hydraulic Conductivity (Ksat)

Saturated Hydraulic Conductivity (Ksat)— Summary by Map Unit — Cheshire County, New Hampshire (NH005)				
Map unit symbol	Map unit name	Rating (micrometers per second)	Acres in AOI	Percent of AOI
24C	Agawam fine sandy loam, 8 to 15 percent slopes	77.6364	12.0	10.1%
26C	Windsor loamy sand, 8 to 15 percent slopes	100.0000	1.9	1.6%
161E	Lyman-Tunbridge-Rock outcrop complex, 25 to 60 percent slopes	8.7324	0.1	0.1%
299	Udorthents, smoothed		4.2	3.5%
W	Water		14.9	12.6%
Subtotals for Soil Survey Area			33.1	27.8%
Totals for Area of Interest			118.9	100.0%

Saturated Hydraulic Conductivity (Ksat)— Summary by Map Unit — Sullivan County, New Hampshire (NH019)				
Map unit symbol	Map unit name	Rating (micrometers per second)	Acres in AOI	Percent of AOI
AgB	Agawam fine sandy loam, 3 to 8 percent slopes	77.6364	13.0	11.0%
HcC	Haven very fine sandy loam, 8 to 15 percent slopes	96.8421	1.8	1.6%
Lk	Limerick silt loam	9.1722	16.2	13.7%
LsE	Lyman-Monadnock-Rock outcrop complex, 25 to 50 percent slopes, very stony	8.7324	0.0	0.0%
MvD	Monadnock-Lyman stony fine sandy loams, 15 to 25 percent slopes	16.8173	4.7	4.0%
Of	Ondawa fine sandy loam, 0 to 3 percent slopes, occasionally flooded	58.5455	0.5	0.4%
W	Water		16.4	13.8%
WdC	Windsor loamy sand, 8 to 15 percent slopes	100.0000	2.8	2.3%
Wn	Winooski silt loam	23.2833	30.2	25.4%
Subtotals for Soil Survey Area			85.8	72.2%
Totals for Area of Interest			118.9	100.0%



Description

Saturated hydraulic conductivity (Ksat) refers to the ease with which pores in a saturated soil transmit water. The estimates are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity is considered in the design of soil drainage systems and septic tank absorption fields.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

The numeric Ksat values have been grouped according to standard Ksat class limits.

Rating Options

Units of Measure: micrometers per second

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Fastest

Interpret Nulls as Zero: No

Layer Options (Horizon Aggregation Method): All Layers (Weighted Average)



2 EXECUTIVE PARK DRIVE
BEDFORD, NH
603-666-7181

JOB NO. 14747 - Walpole/Charleston NH 12
SHEET NO. 1 OF 1
CALCULATED BY: JRB DATE: 6/1/2017
CHECKED BY: RRP DATE: 6/14/2017

Determine Area of Perforations in Corrugated Plastic Pipe

References:

ADS Technical Note, Dual Wall HDPE Perforation Patterns, TN 1.01 (January 2015)
Springfield Plastics Inc Dual Wall Drainage Pipe Technical Data Sheet

Calculate Perforations Area for 12" diameter pipe:

12" pipe is used for BMP transverse drainage without any flow from the shared ditch or offsite.

Drainage Notes B1, B2, B3, & B4:

Number of valleys per ft of pipe: 6
Number of perforations per valley: 3
Pipe length: 34 If
Total number of perforations: 612

Perforation hole diameter: 0.313 in
Area of each perforation: 0.0707 sq. in.

Total area of perforations: 43.2684 sq in.
0.300475 sq ft.

Equivalent single diameter opening: 7.424216 in

Calculate Perforations Area for 15" diameter pipe:

15" pipe is used for combining BMP transverse drainage and flow from the shared ditch or offsite.

Drainage Notes 103, 112, 118, 131:

Number of valleys per ft of pipe: 4.5
Number of perforations per valley: 3
Pipe length: 40 If
Total number of perforations: 540

Perforation hole diameter: 0.313 in
Area of each perforation: 0.0707 sq. in.

Total area of perforations: 38.178 sq in.
0.265125 sq ft.

Equivalent single diameter opening: 6.973836 in

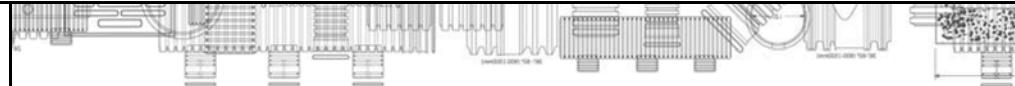
Drainage Notes 153, 160, 168:

4.5
3
32 If
432

0.313 in
0.0707 sq. in.

30.5424 sq in.
0.2121 sq ft.

6.237589 in



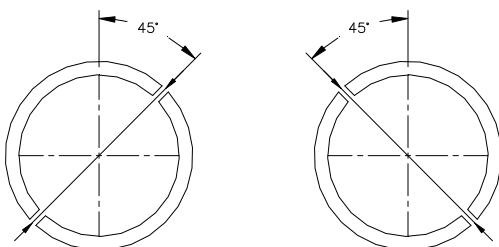
TECHNICAL NOTE

Single Wall HDPE Perforation Patterns

TN 1.02
October 2008

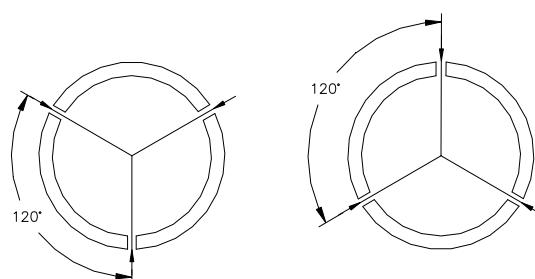
Nominal I.D.		Perforation Type	Maximum Slot Length or Diameter		Maximum Slot Width		Minimum Inlet Area		Pattern Type
in	mm		in	mm	in	mm	in ² /ft	cm ² /m	
3	75	Slot	0.875	22	0.120	3	1.0	21	A
4	100	Slot	0.875	22	0.120	3	1.0	21	B
5	125	Slot	0.875	22	0.120	3	1.0	21	B
6	150	Slot	0.875	22	0.120	3	1.0	21	B
8	200	Slot	1.18	30	0.120	3	1.0	21	B
10	250	Slot	1.18	30	0.120	3	1.0	21	B
12	300	Slot	1.50	38	0.118	3	1.5	32	B
12	300	Circular	0.313	8	-	-	1.5	32	C
15	375	Circular	0.313	8	-	-	1.5	32	C
18	450	Circular	0.313	8	-	-	1.5	32	C
24	600	Circular	0.313	8	-	-	2.0	42	D

TYPE A PATTERN



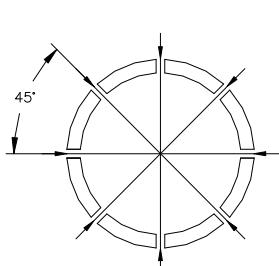
2 SLOT PATTERN
PERFORATIONS
ROTATED 90° EVERY
OTHER VALLEY

TYPE B PATTERN



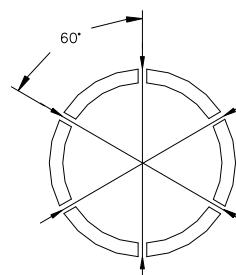
3 SLOT PATTERN
PERFORATIONS
ROTATED 60° EVERY
OTHER VALLEY

TYPE C PATTERN



8 HOLE PATTERN

TYPE D PATTERN



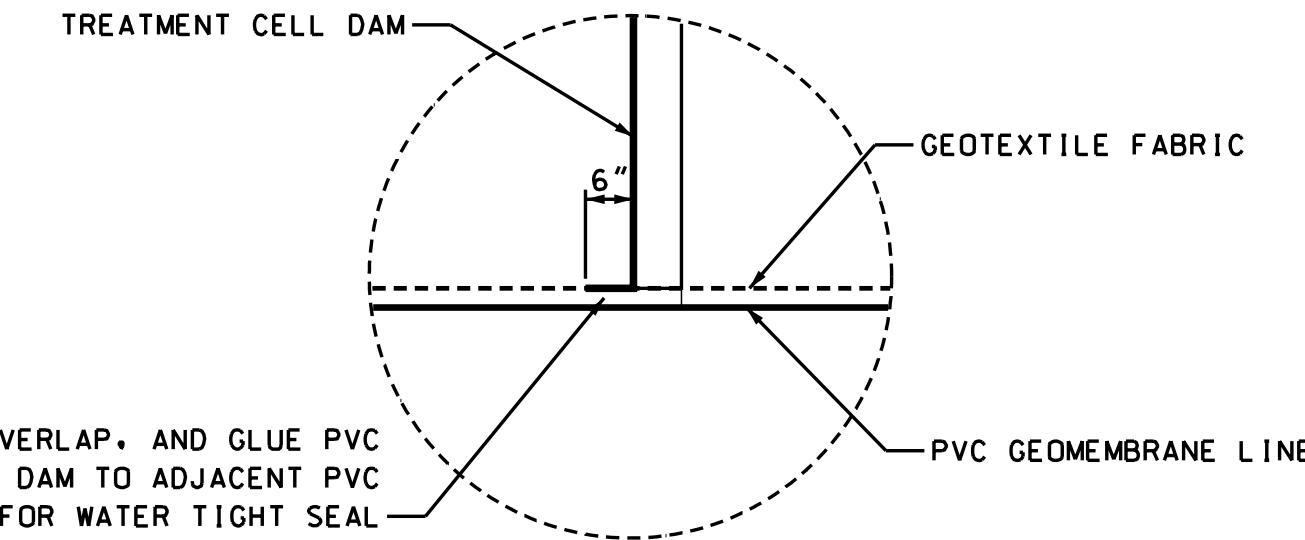
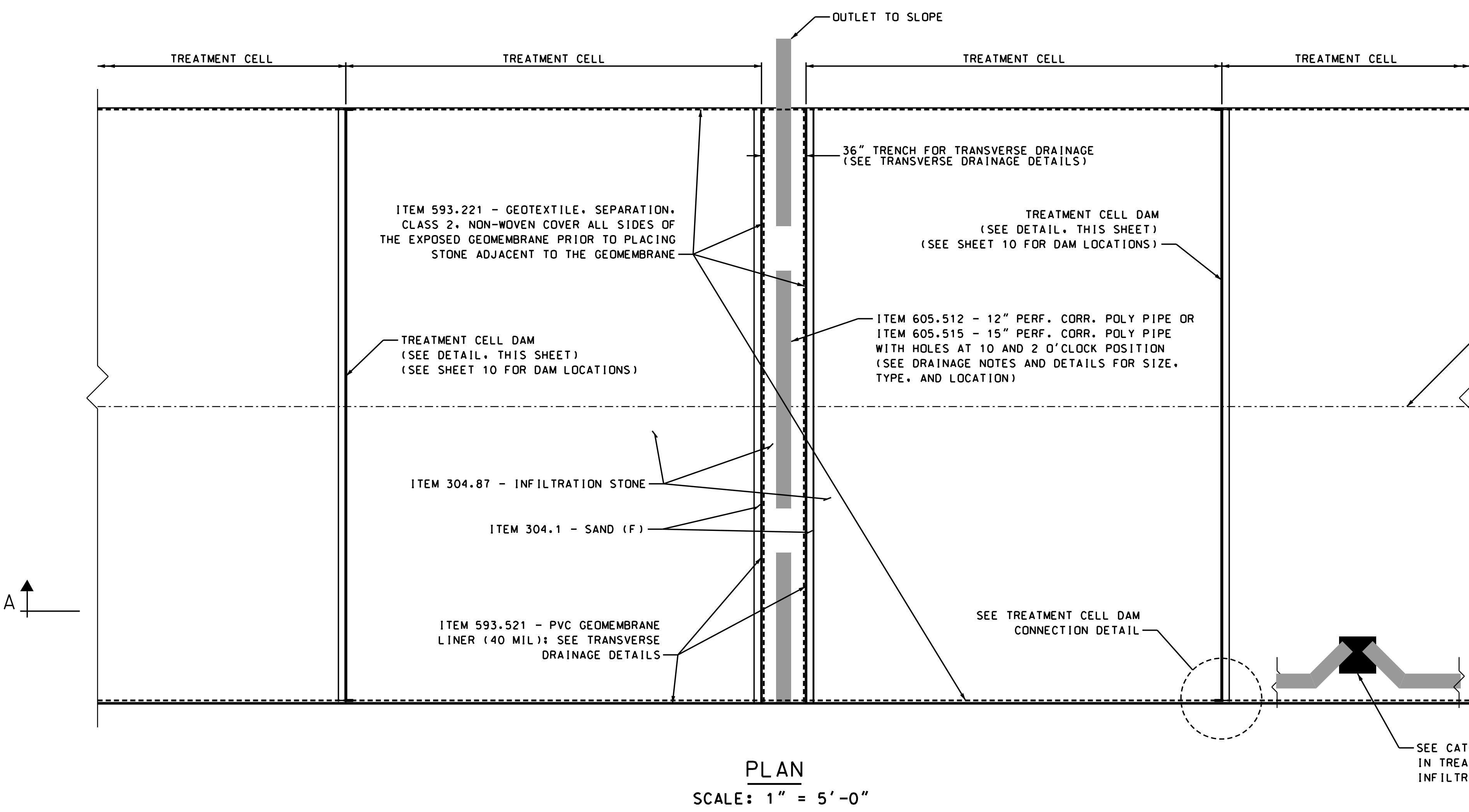
6 HOLE PATTERN

New Hampshire Department of Transportation
Walpole-Charlestown, X-A000(487),14747
N.H. Route 12 Reconstruction

POLLUTANT LOADING ANALYSIS REPORT

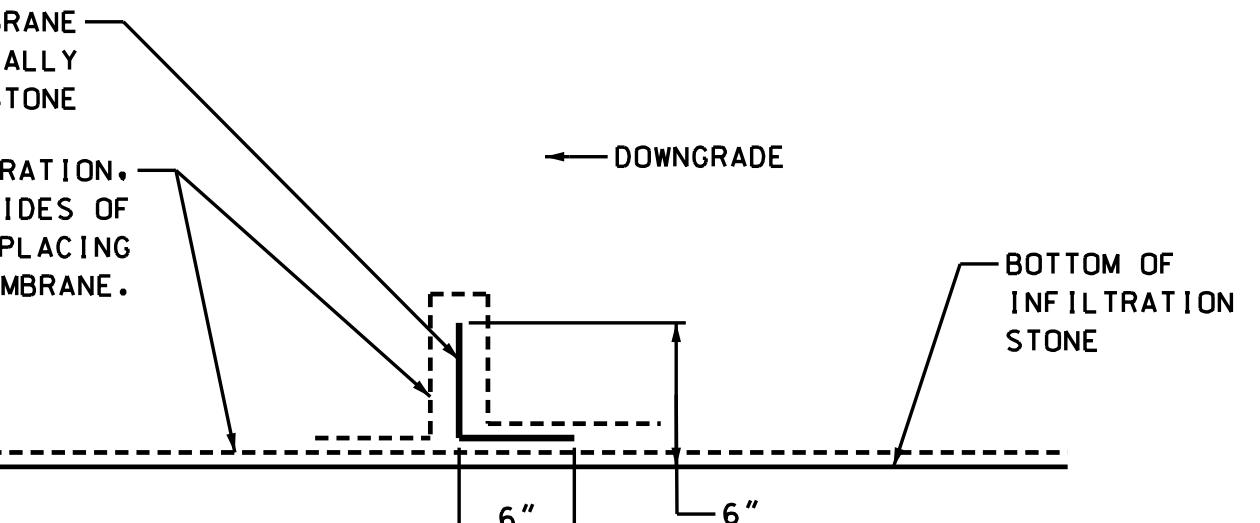
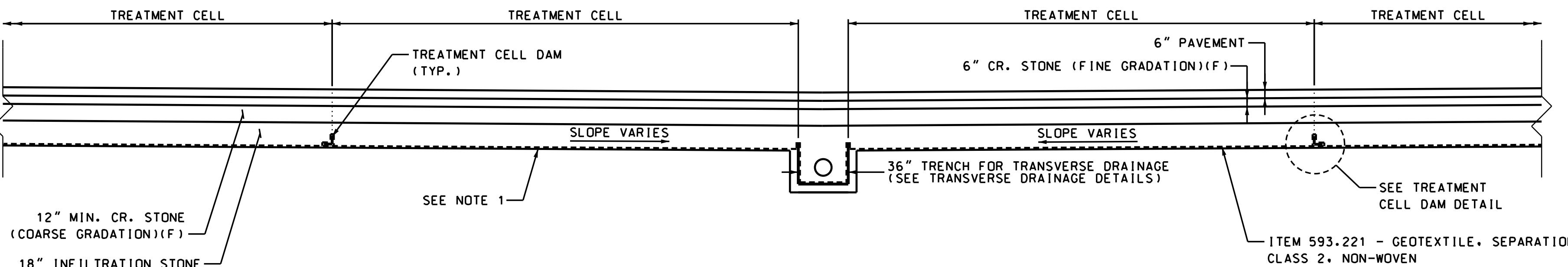
APPENDIX 9:

INFILTRATION BMP DESIGN DETAILS AND PROFILE



TREATMENT CELL DAM CONNECTION
(PLAN VIEW)
NOT TO SCALE

PLAN
SCALE: 1" = 5'-0"



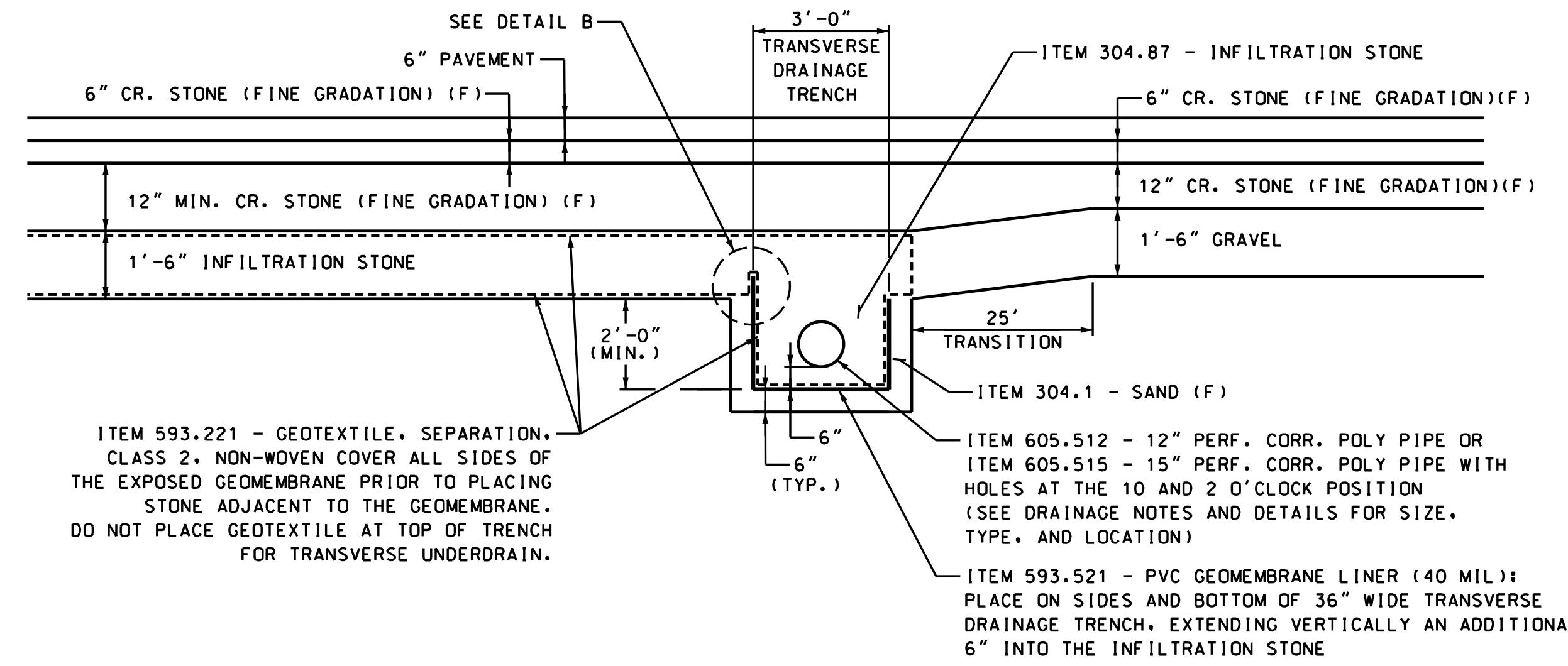
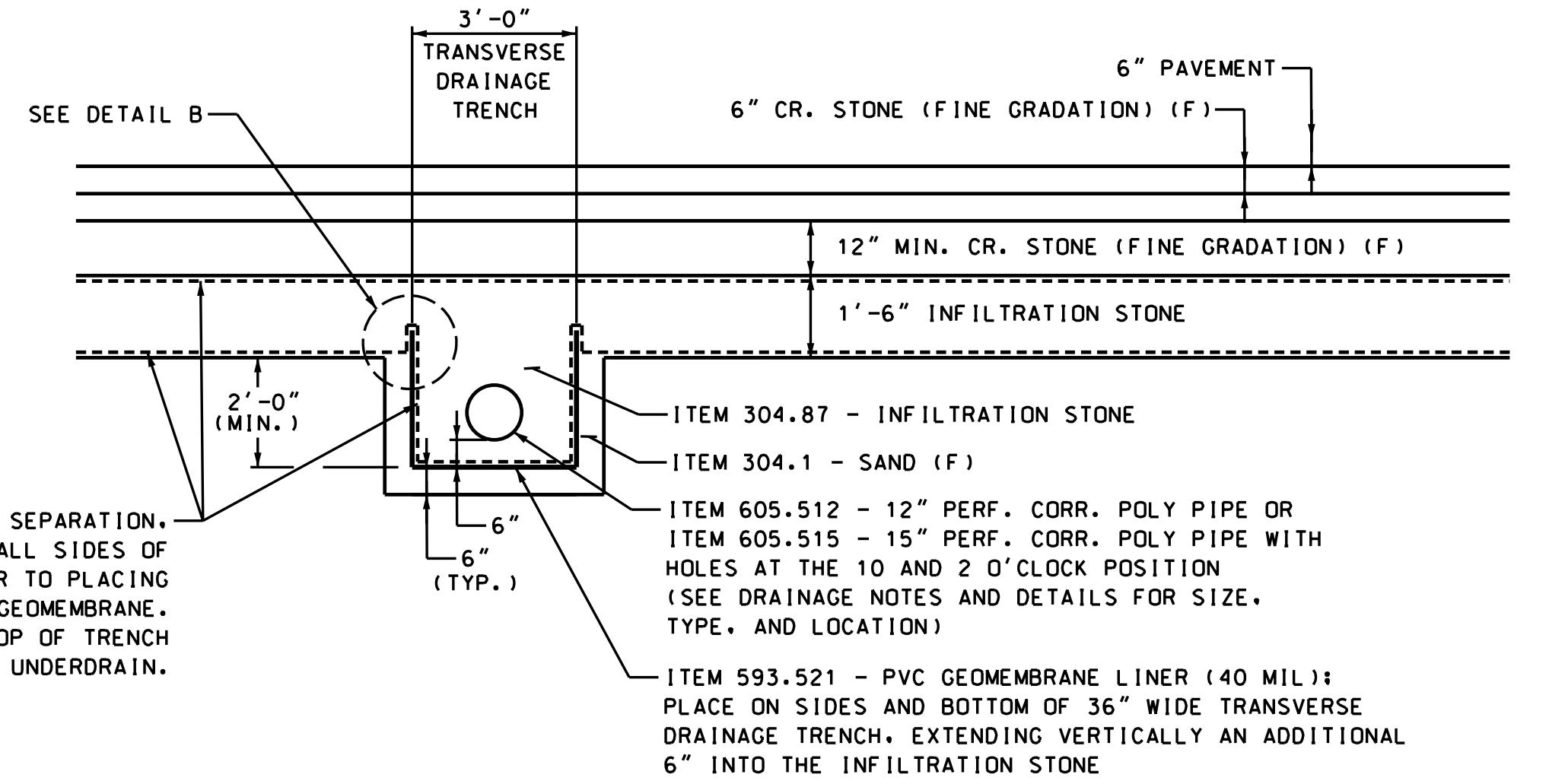
TREATMENT CELL DAM
VERTICAL SEPARATOR DETAIL
(LONG SECTION VIEW)
NOT TO SCALE

NOTE:
1. SEE PROFILE FOR BOTTOM OF INFILTRATION STONE ELEVATIONS.

LONGITUDINAL SECTION A-A

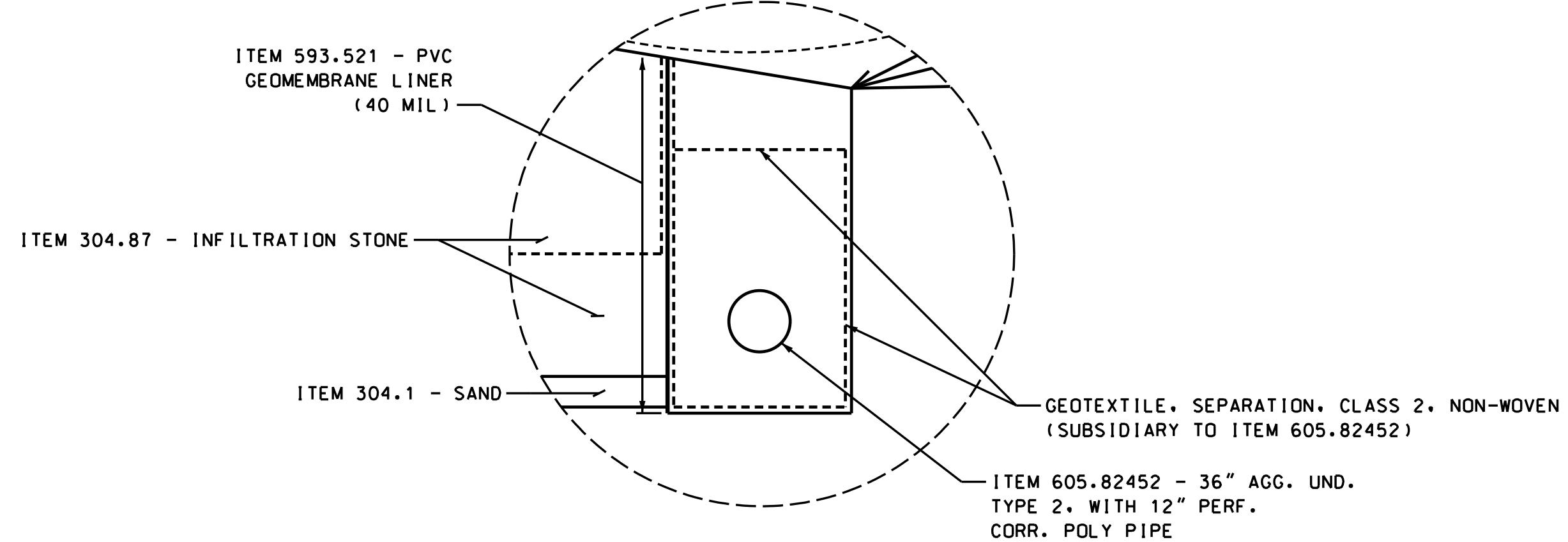
SCALE: 1" = 5'-0"

STATE OF NEW HAMPSHIRE			
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN			
INFILTRATION BMP			
DETAILS (1 OF 3)			
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
14747TY03	14747	14	220



TRANSVERSE DRAINAGE AT LOW POINT

NOT TO SCALE

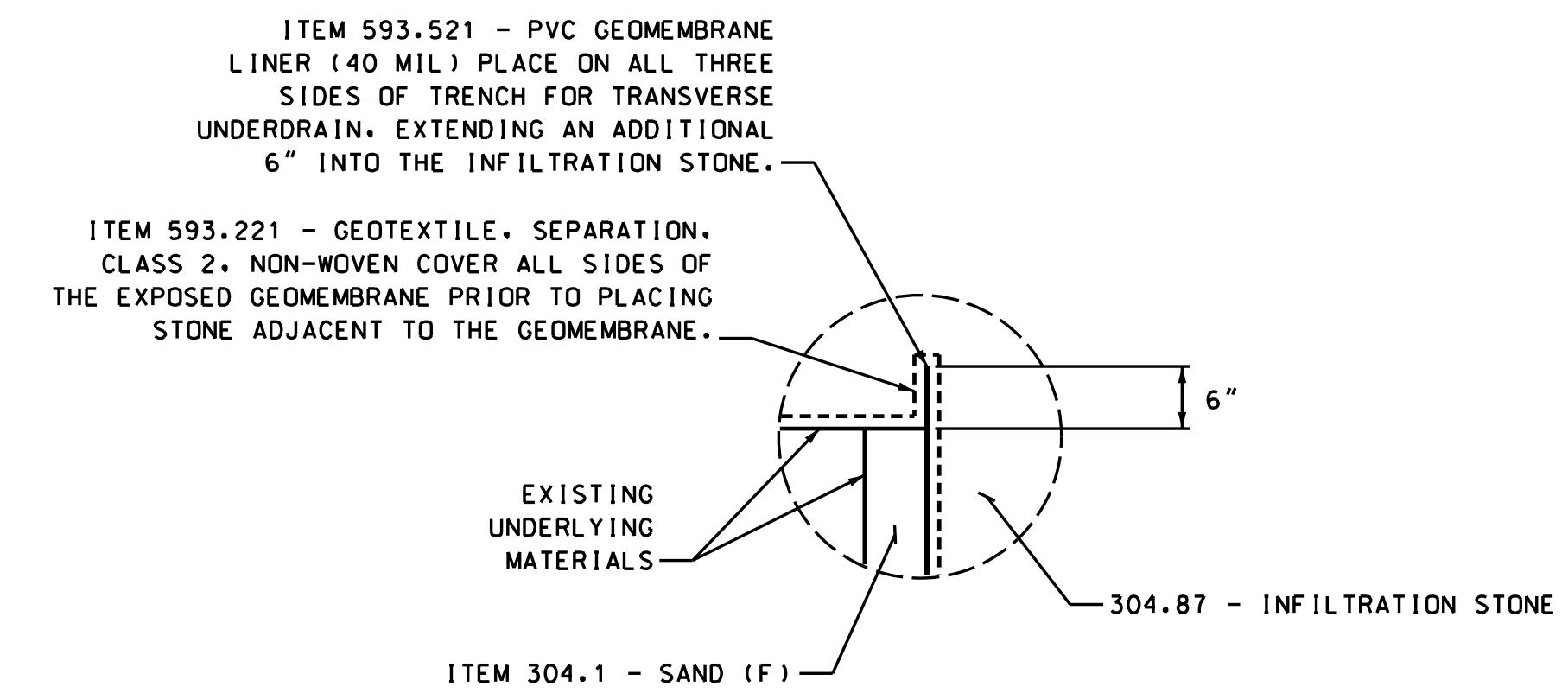


DETAIL A

NOT TO SCALE

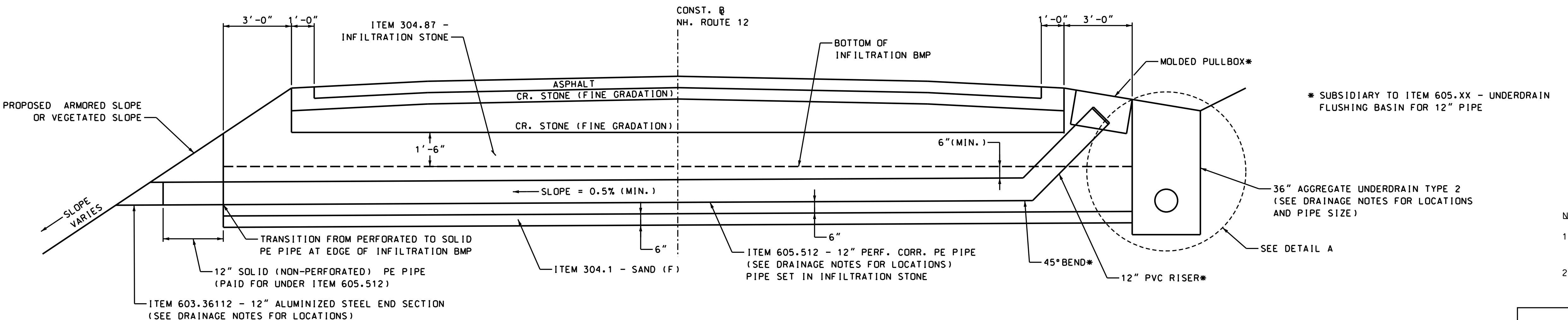
TRANSVERSE DRAINAGE AT TRANSITION TO NON-TREATMENT AREA

NOT TO SCALE



DETAIL B

NOT TO SCALE



- NOTE:
1. THE CONTRACTOR SHALL NOT DISTURB THE EXISTING RAILROAD.
 2. NO ROUNDING SHALL APPLY IN WETLAND AREAS.

36" TRANSVERSE DRAINAGE TRENCH W/ 12" PE PIPE

NOT TO SCALE

TRANSVERSE DRAINAGE DETAILS

SEE N.H. ROUTE 12 PROFILE AND DRAINAGE NOTES FOR LOCATIONS

STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

INFILTRATION BMP DETAILS (2 OF 3)

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
14747TY04	14747	15	220

TREATMENT AREA #1
Station 2012+25 TO 2022+56

DAM NO.	STATION	COMMENTS
1	2013+16.5	AT TRANSVERSE DRAINAGE TRENCH (103)
2	2013+19.5	AT TRANSVERSE DRAINAGE TRENCH (103)
3	2015+03	
4	2016+03	
5	2017+03	
6	2018+03	
7	2019+03	
8	2022+53	AT TRANSVERSE DRAINAGE TRENCH (B1)

TREATMENT AREA #2
Station 2025+03 TO 2039+00

DAM NO.	STATION	COMMENTS
9	2025+05	AT TRANSVERSE DRAINAGE TRENCH (112)
10	2025+73	
11	2026+23	
12	2026+75	
13	2027+27	
14	2027+93	
15	2029+95	
16	2030+57	
17	2031+48	
18	2033+29.5	AT TRANSVERSE DRAINAGE TRENCH (118)
19	2033+32.5	AT TRANSVERSE DRAINAGE TRENCH (118)
20	2034+00	
21	2034+36	
22	2034+67	
23	2034+96	
24	2035+23	
25	2035+51	
26	2035+79	
27	2036+07	
28	2036+34	
29	2036+63	
30	2036+93	
31	2037+29	
32	2037+70	
33	2038+24	
34	2038+99	

TREATMENT AREA #3
Station 2049+00 TO 2062+00

DAM NO.	STATION	COMMENTS
35	2049+25	
36	2049+75	
37	2050+26	
38	2050+85	
39	2051+61	
40	2052+98.5	
41	2053+01.5	
42	2053+98.5	AT TRANSVERSE DRAINAGE TRENCH (131)
43	2054+01.5	AT TRANSVERSE DRAINAGE TRENCH (131)
44	2055+27	
45	2056+28	
46	2057+28	
47	2058+28	
48	2059+35	
49	2061+97	AT TRANSVERSE DRAINAGE TRENCH (135)

LOCATIONS OF TREATMENT CELL DAMS

NOT TO SCALE

REVISONS AFTER PROPOSAL

DESCRIPTION

STATION

NUMBER

DATE

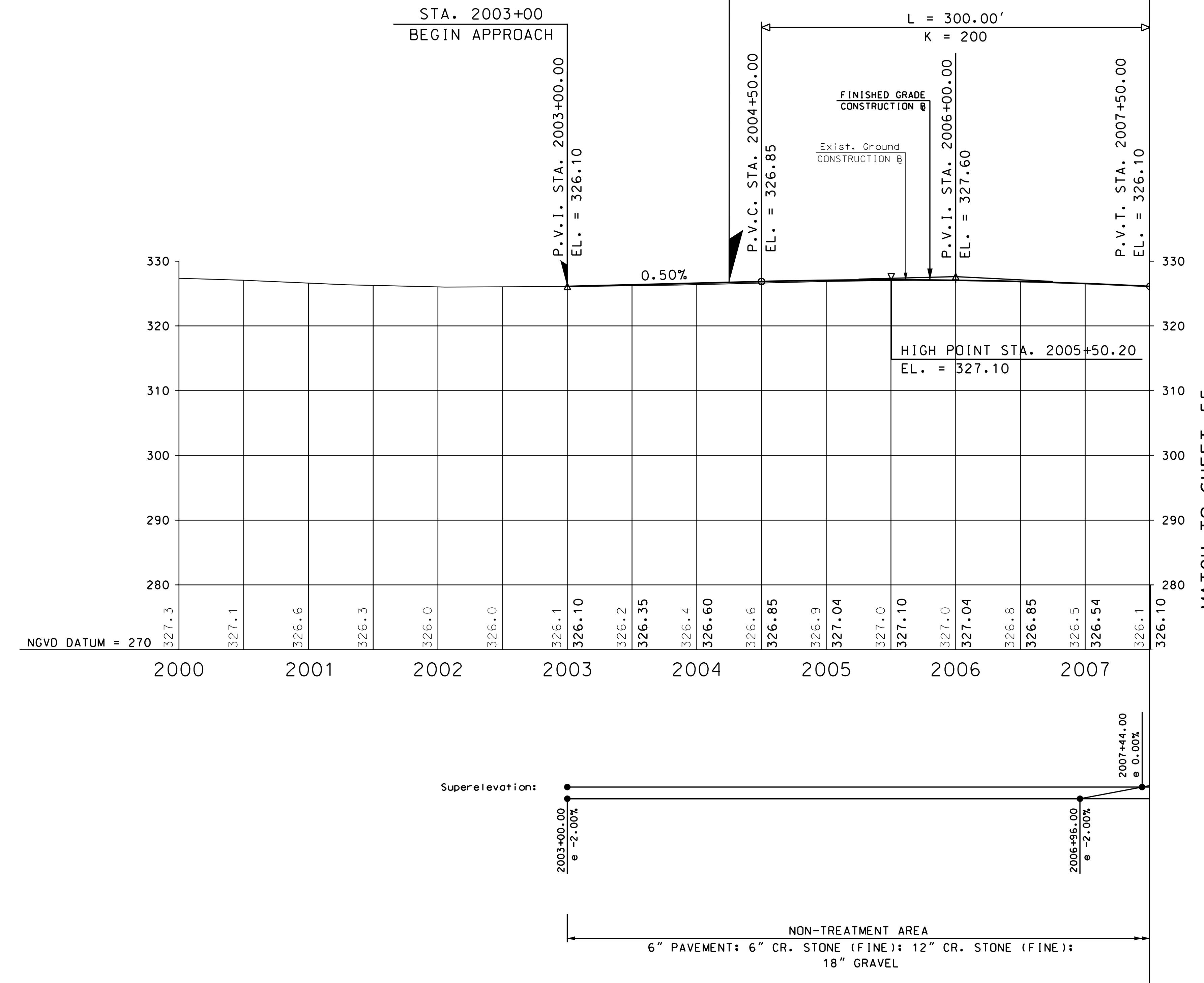
STATION

NUMBER

STA. 2004+25

BEGIN CONSTRUCTION

END APPROACH



NOTE:	
XXX.X	= EXISTING GROUND
XXX.XX	= PROPOSED TOP OF ROADWAY
(XXX.XX)	= PROPOSED BOTTOM OF INFILTRATION STONE

PROFILE - N.H. ROUTE 12

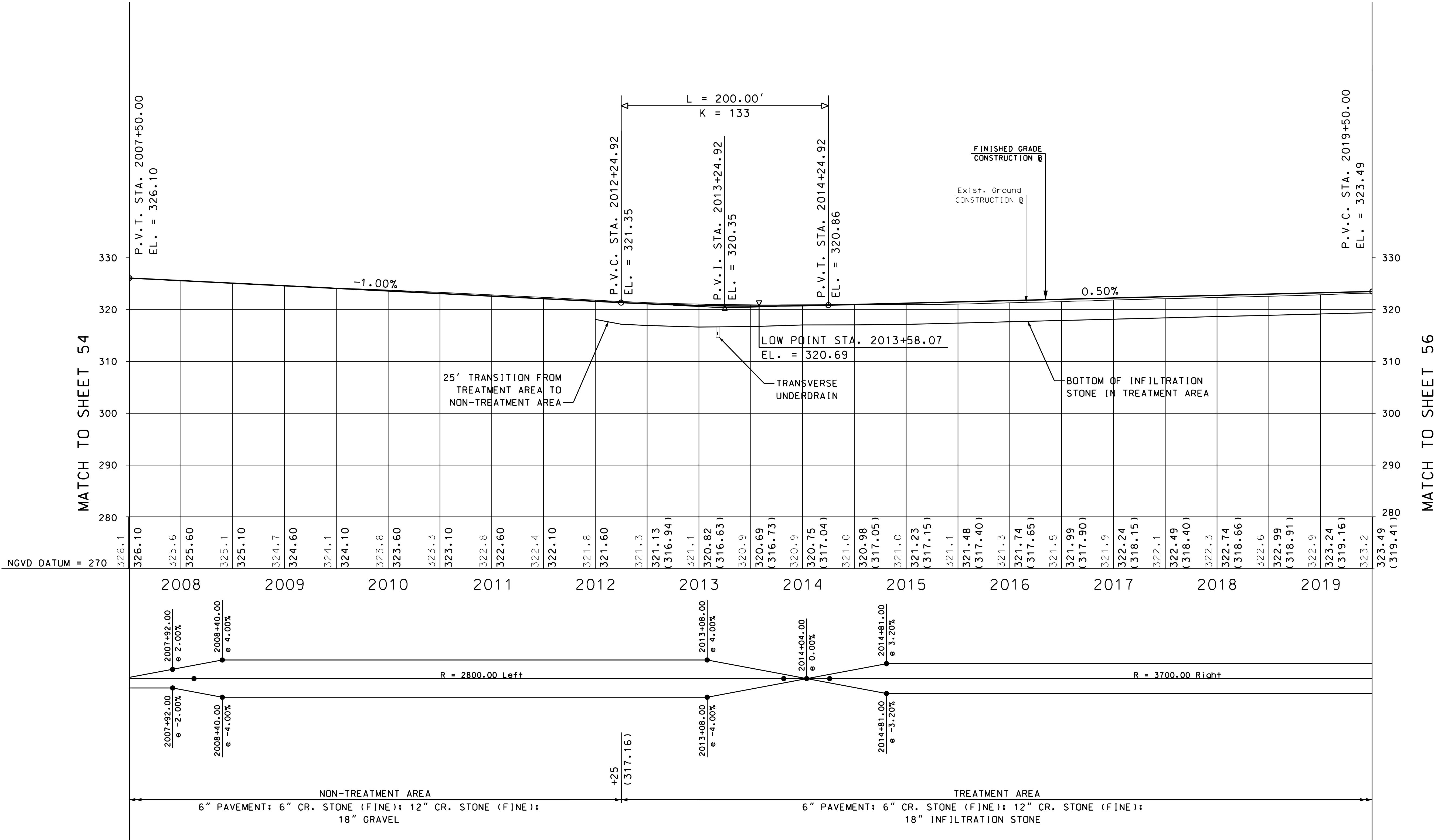
SCALE:
1" = 50' HORIZ.
1" = 10' VERT.

STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

**PROFILE
N.H. ROUTE 12**

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
PRO01	14747PRO_MC8M	14747	54	220



NOTE:

XXX.X = EXISTING GROUND

XXX.XX = PROPOSED TOP OF ROADWAY

(XXX.XX) = PROPOSED BOTTOM OF
INFILTRATION STONE

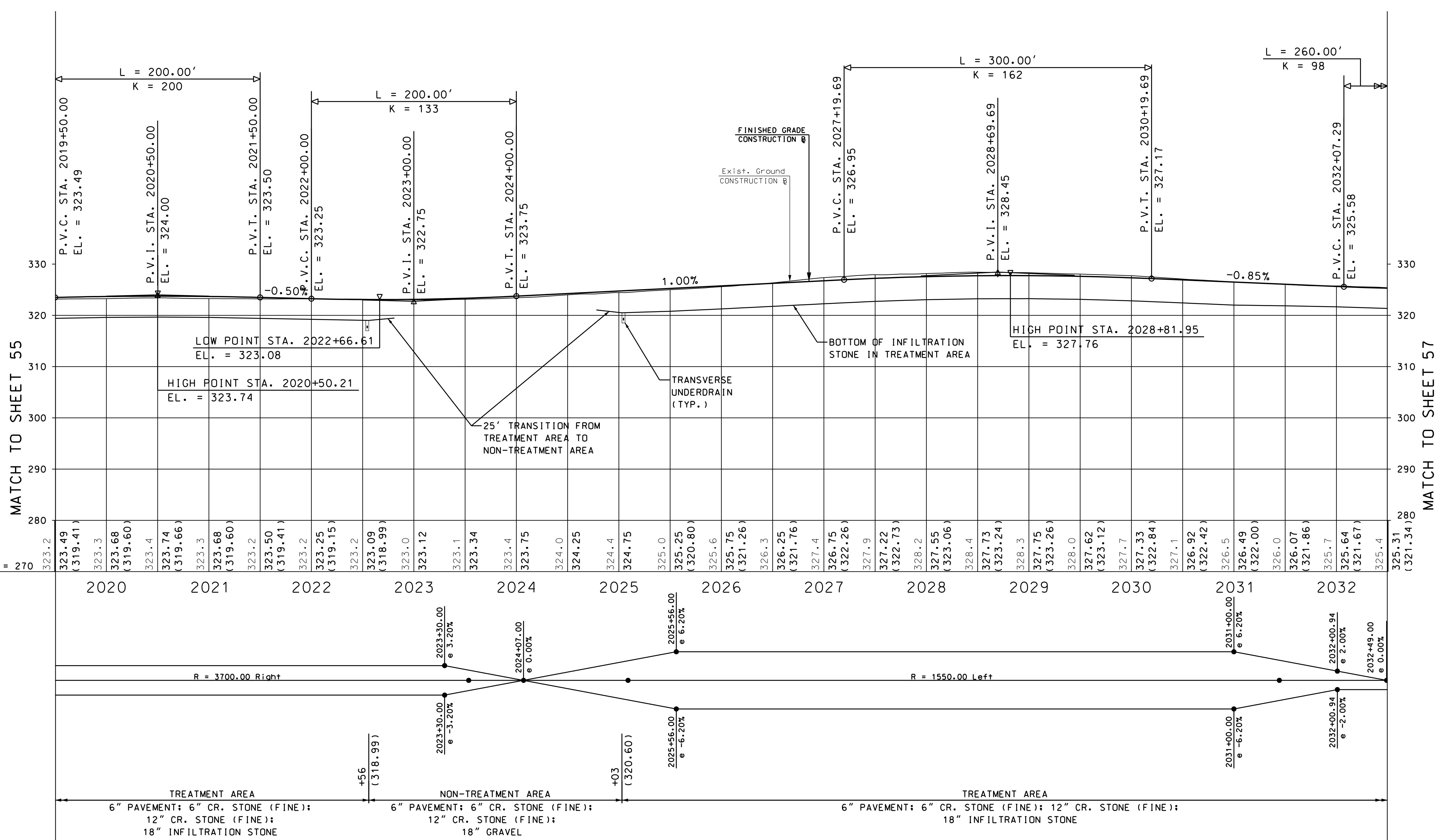
PROFILE - N.H. ROUTE 12

SCALE:
1 ″ = 50' HORIZ
1 ″ = 10' VERT.

STATE OF NEW HAMPSHIRE				
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN				
<i>PROFILE N.H. ROUTE 12</i>				
MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
PR002	14747PRO_MC8M	14747	55	220

SDR PROCESSED	S. GUNN	DATE	05-2017	REVISIONS AFTER PROPOSAL
NEW DESIGN	A. SEAMAN	DATE	05-2017	STATION
SHEET CHECKED	C. MERCER	DATE	05-2017	DESCRIPTION
AS BUILT DETAILS		DATE		

MATCH TO SHEET 55



PROFILE - N.H. ROUTE 12

SCALE:
 1" = 50' HORIZ.
 1" = 10' VERT.

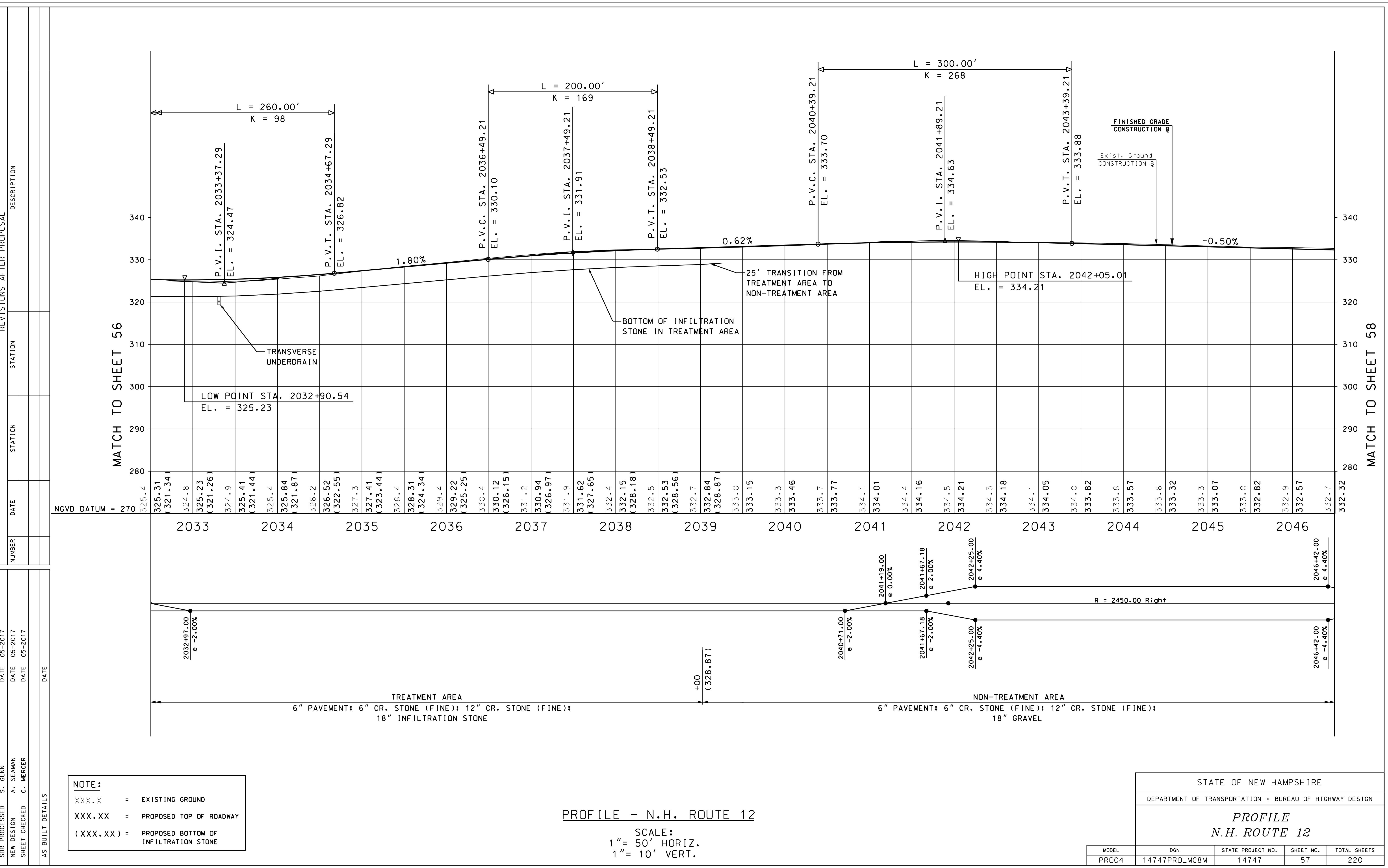
STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

PROFILE
N.H. ROUTE 12

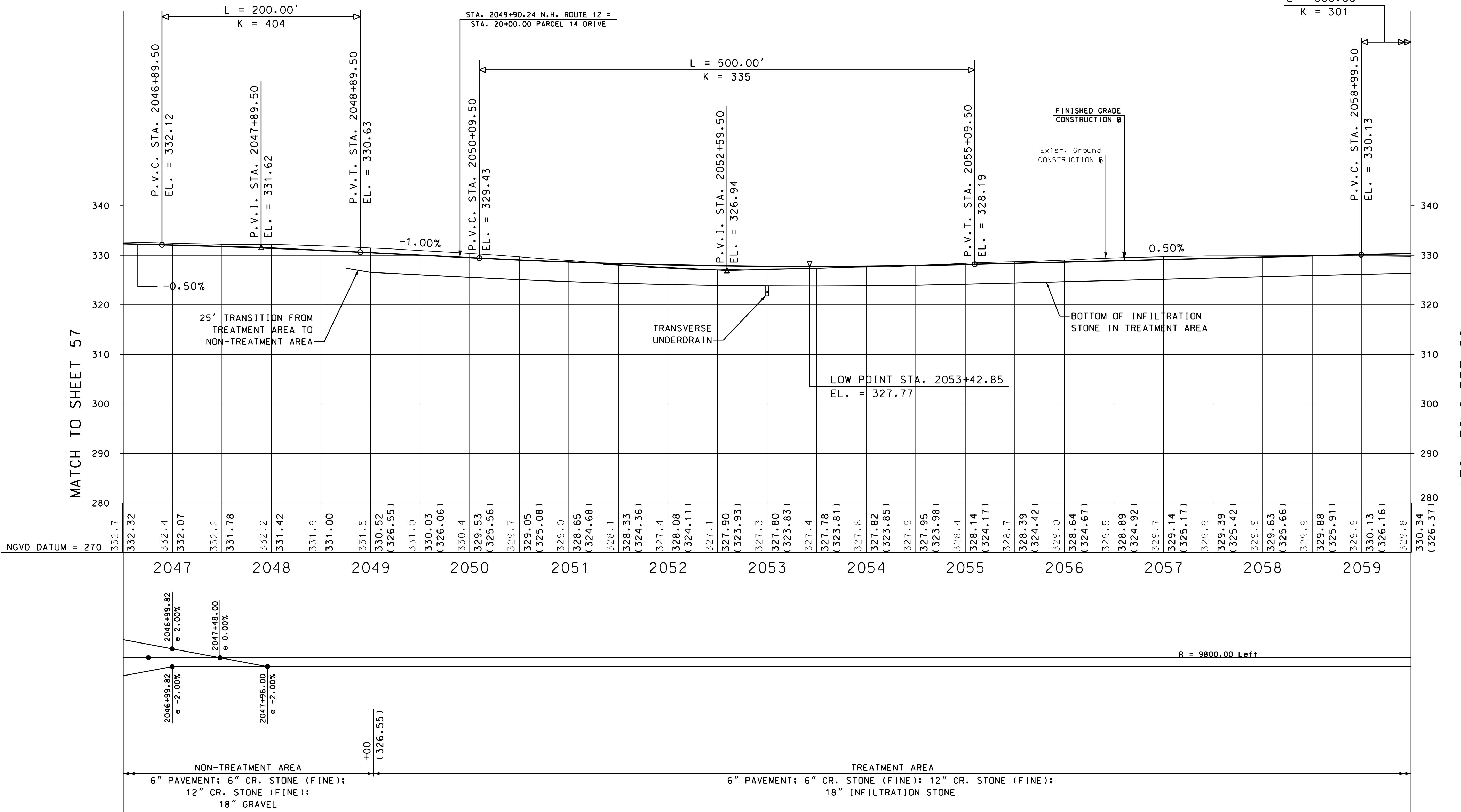
MODEL	DGN	STATE PROJECT NO.	sheet no.	total sheets
PRO03	14747PRO_MC8M	14747	56	220

MATCH TO SHEET 57



REVISIONS AFTER PROPOSAL			
		STATION	DESCRIPTION
SDR PROCESSED	S. GUNN	DATE 05-2017	
NEW DESIGN	A. SEAMAN	DATE 05-2017	
SHEET CHECKED	C. MERCER	DATE 05-2017	
AS BUILT DETAILS		DATE	

MATCH TO SHEET 57



PROFILE - N.H. ROUTE 12

SCALE:
 1" = 50' HORIZ.
 1" = 10' VERT.

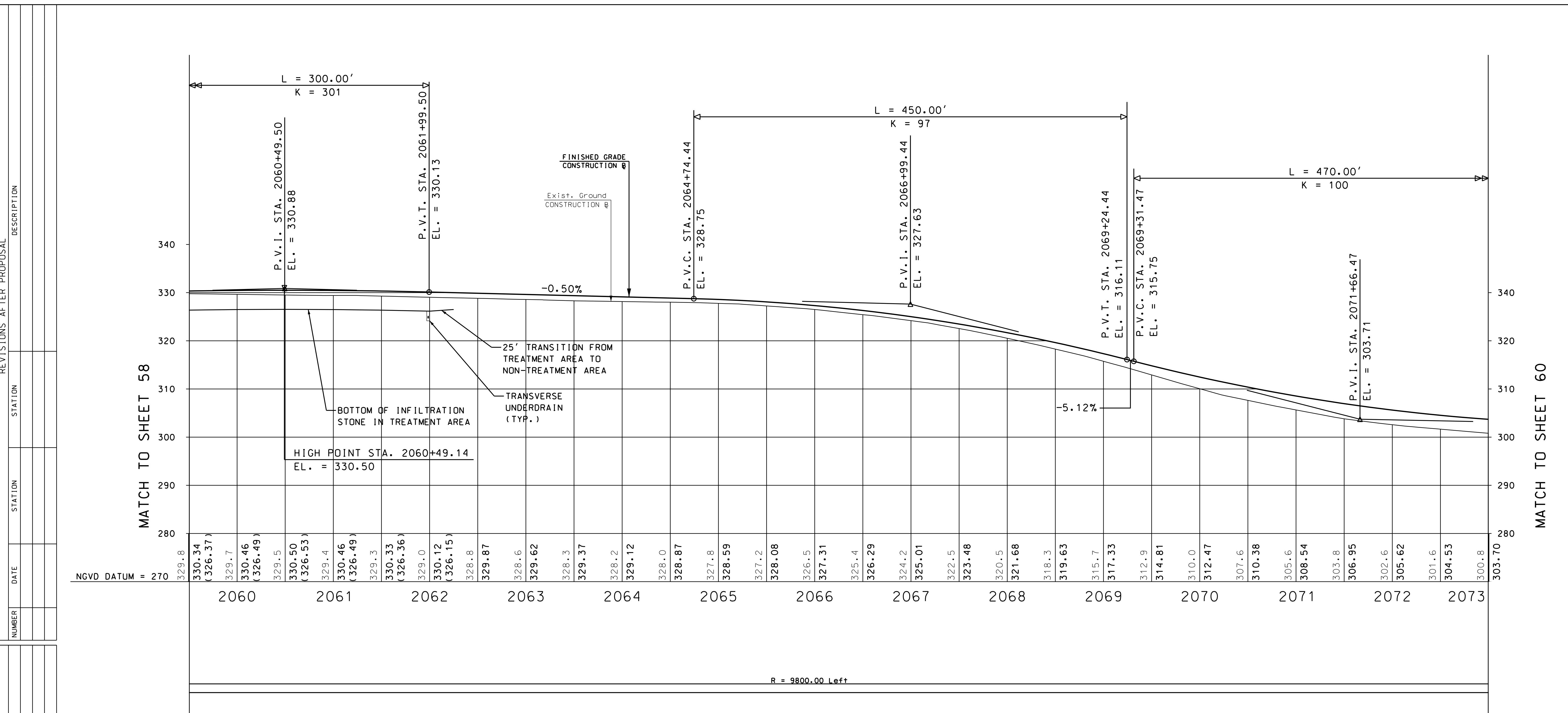
STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

PROFILE
N.H. ROUTE 12

MODEL	DGN	STATE PROJECT NO.	sheet no.	total sheets
PRO05	14747PRO_MC8M	14747	58	220

MATCH TO SHEET 59



NOTE:

- XXX.X = EXISTING GROUND
- XXX.XX = PROPOSED TOP OF ROADWAY
- (XXX.XX) = PROPOSED BOTTOM OF INFILTRATION STONE

PROFILE - N.H. ROUTE 12

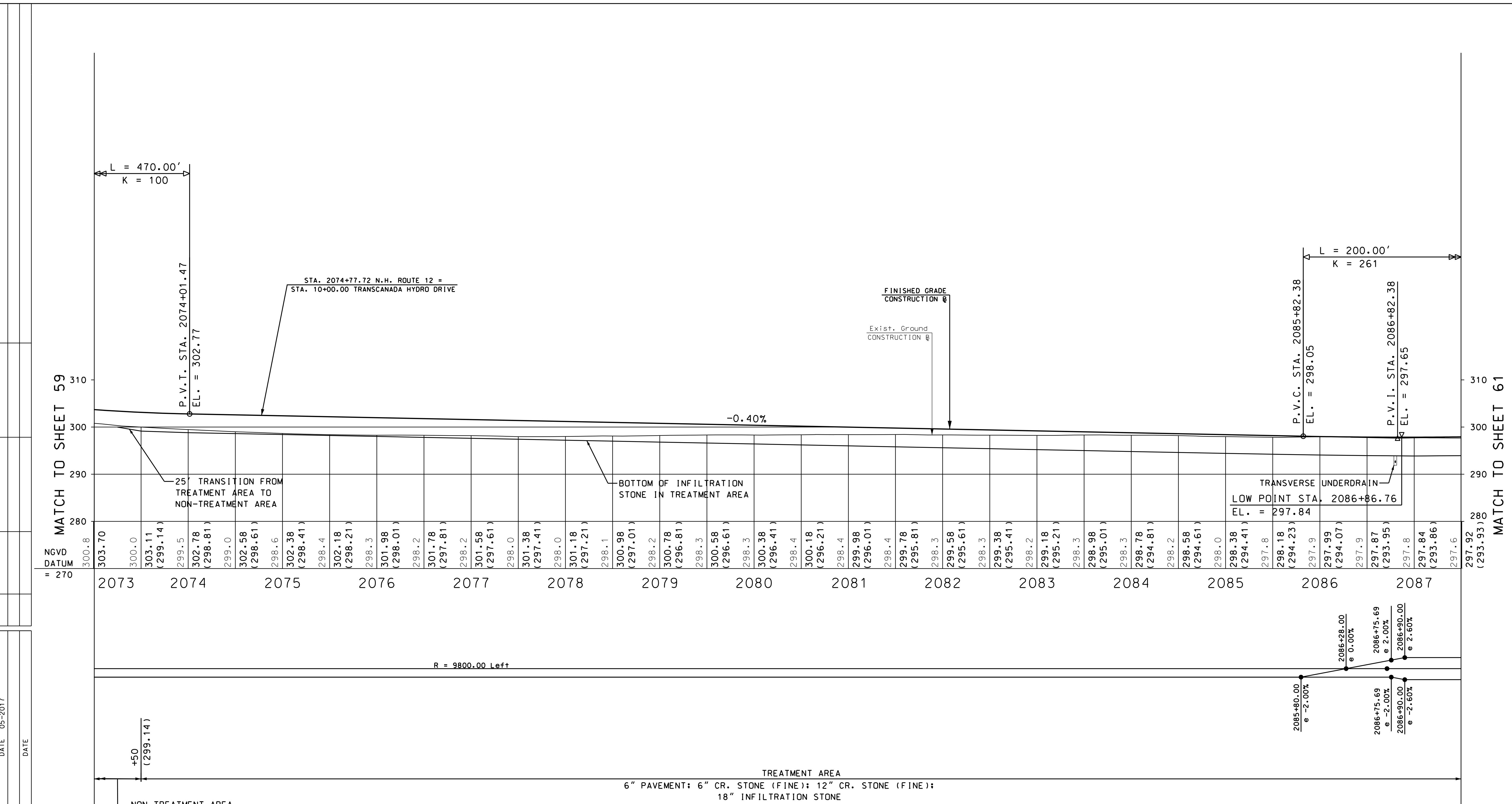
SCALE:
1" = 50' HORIZ.
1" = 10' VERT.

STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

PROFILE
N.H. ROUTE 12

MODEL	DGN	STATE PROJECT NO.	sheet no.	TOTAL SHEETS
PR006	14747PRO_MC8M	14747	59	220



NOTE:

XXX.X = EXISTING GROUND

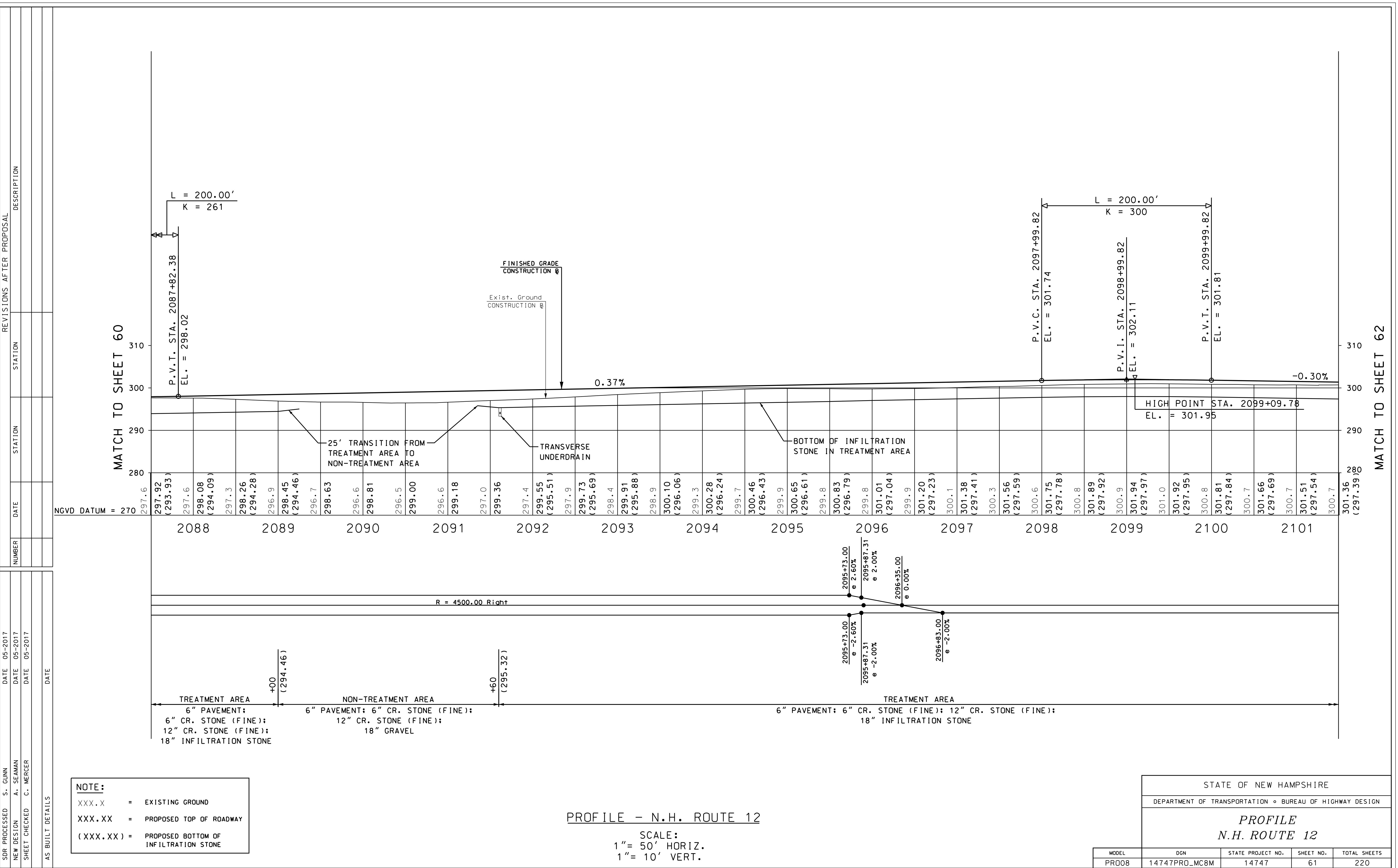
XXX.XX = PROPOSED TOP OF ROADWAY

(XXX.XX) = PROPOSED BOTTOM OF
INFILTRATION STONE

PROFILE = N.H. ROUTE 12

SCALE:
1" = 50' HORIZ
1" = 10' VERT.

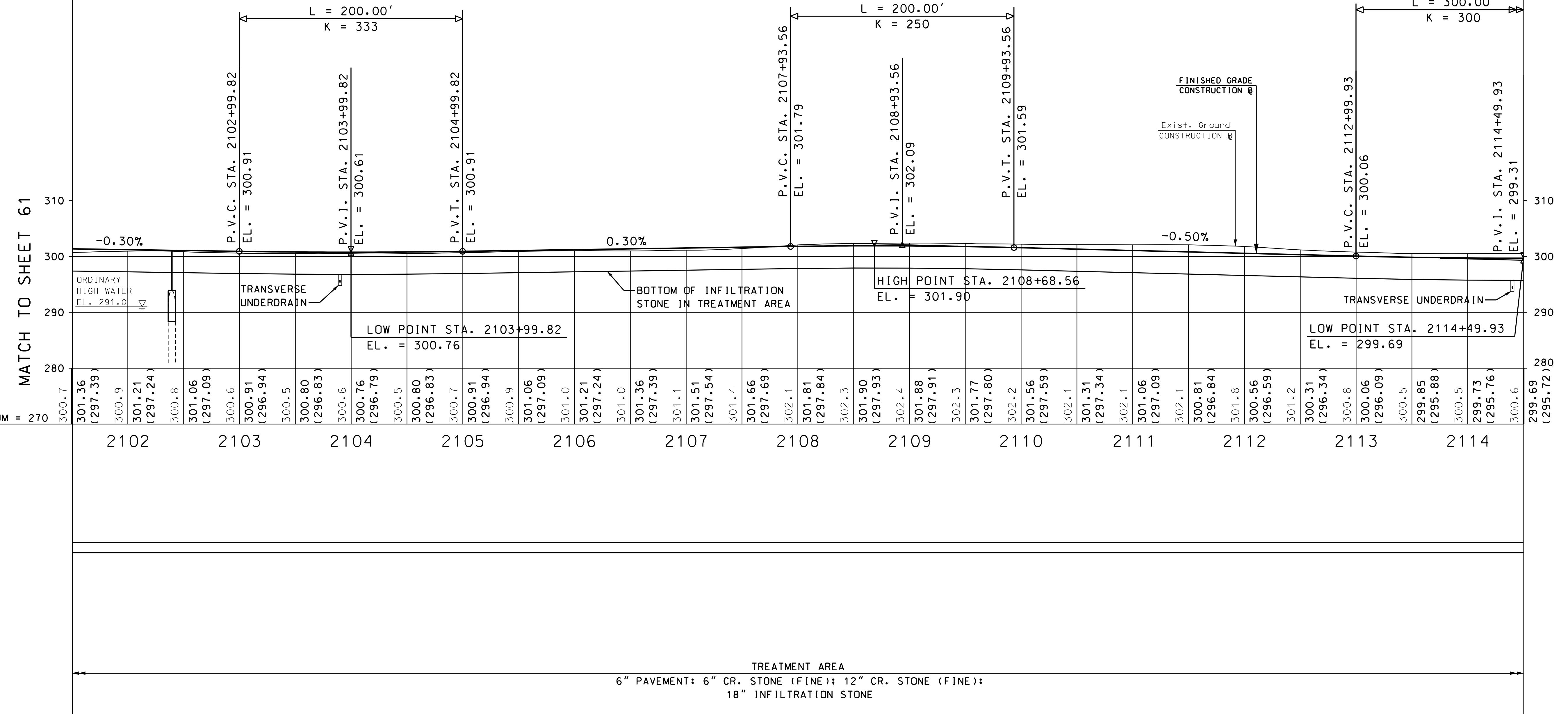
STATE OF NEW HAMPSHIRE				
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN				
<i>PROFILE</i> <i>N.H. ROUTE 12</i>				
MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
PR007	14747PR0 MC8M	14747	60	220



SDR PROCESSED	S. GUNN	DATE	05-2017
NEW DESIGN	A. SEAMAN	DATE	05-2017
SHEET CHECKED	C. MERCER	DATE	05-2017
AS BUILT DETAILS	DATE		

NCVD DATUM = 270

MATCH TO SHEET 61



NOTE:
 XXX.X = EXISTING GROUND
 XXX.XX = PROPOSED TOP OF ROADWAY
 (XXX.XX) = PROPOSED BOTTOM OF INFILTRATION STONE

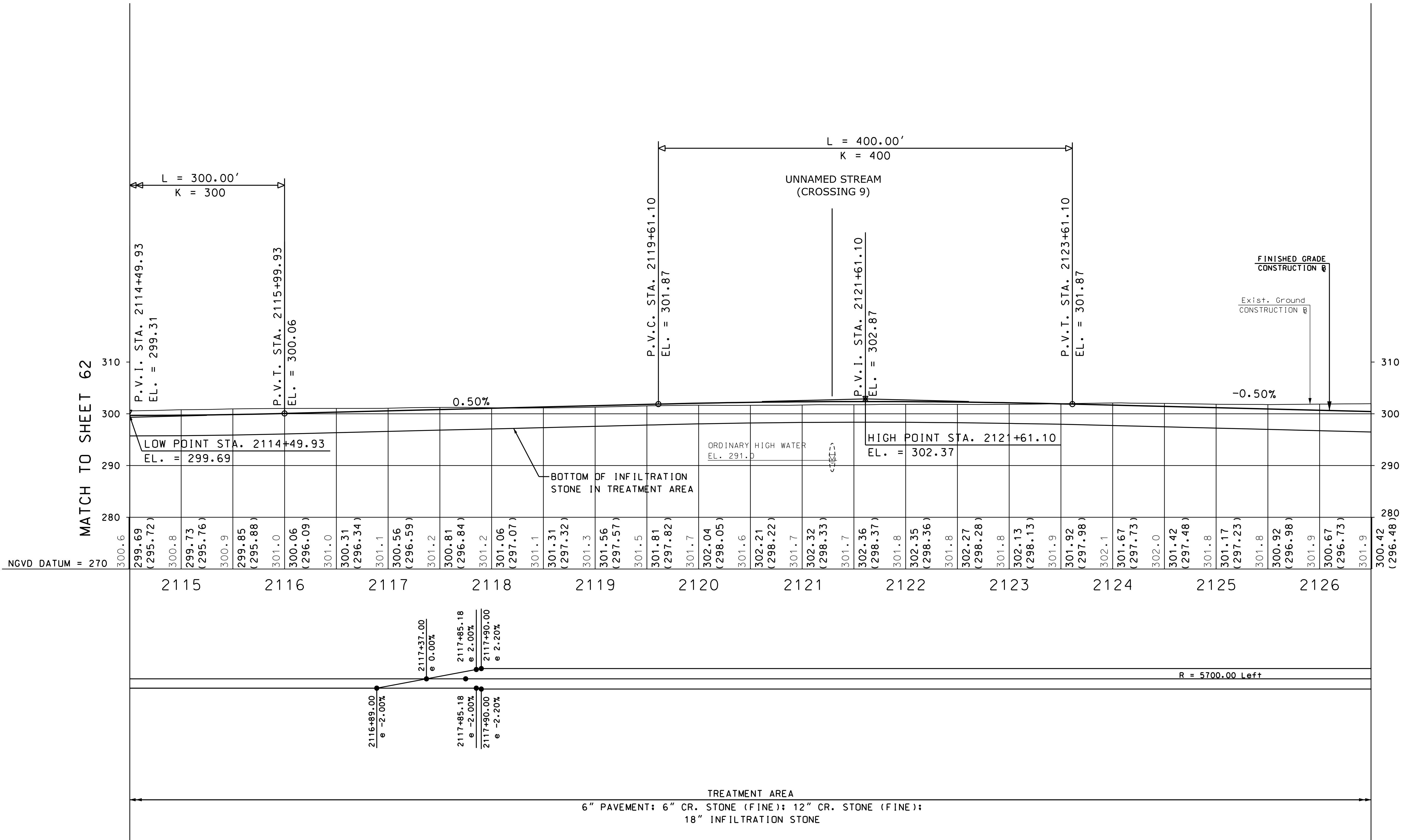
PROFILE - N.H. ROUTE 12

SCALE:
 1" = 50' HORIZ.
 1" = 10' VERT.

STATE OF NEW HAMPSHIRE
 DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN
PROFILE
N.H. ROUTE 12

MODEL	DGN	STATE PROJECT NO.	sheet no.	TOTAL SHEETS
PRO09	14747PRO_MC8M	14747	62	220

MATCH TO SHEET 63



TREATMENT AREA
" PAVEMENT; 6" CR. STONE (FINE); 12" CR. STONE (FINE
18" INFILTRATION STONE

PROFILE - N.H. ROUTE 1

SCALE:
1 ″ = 50' HORIZ
1 ″ = 10' VERT.

AS BUILT DETAILS			
SDR	PROCESSED	S.	GUNN
NEW DESIGN	A.	SEAMAN	DATE 05-2017
SHEET CHECKED	C.	MERCER	DATE 05-2017

NOTE:

XXX.X = EXISTING GROUND

XXX.XX = PROPOSED TOP OF ROADWAY

(XXX.XX) = PROPOSED BOTTOM OF
INFILTRATION STONE

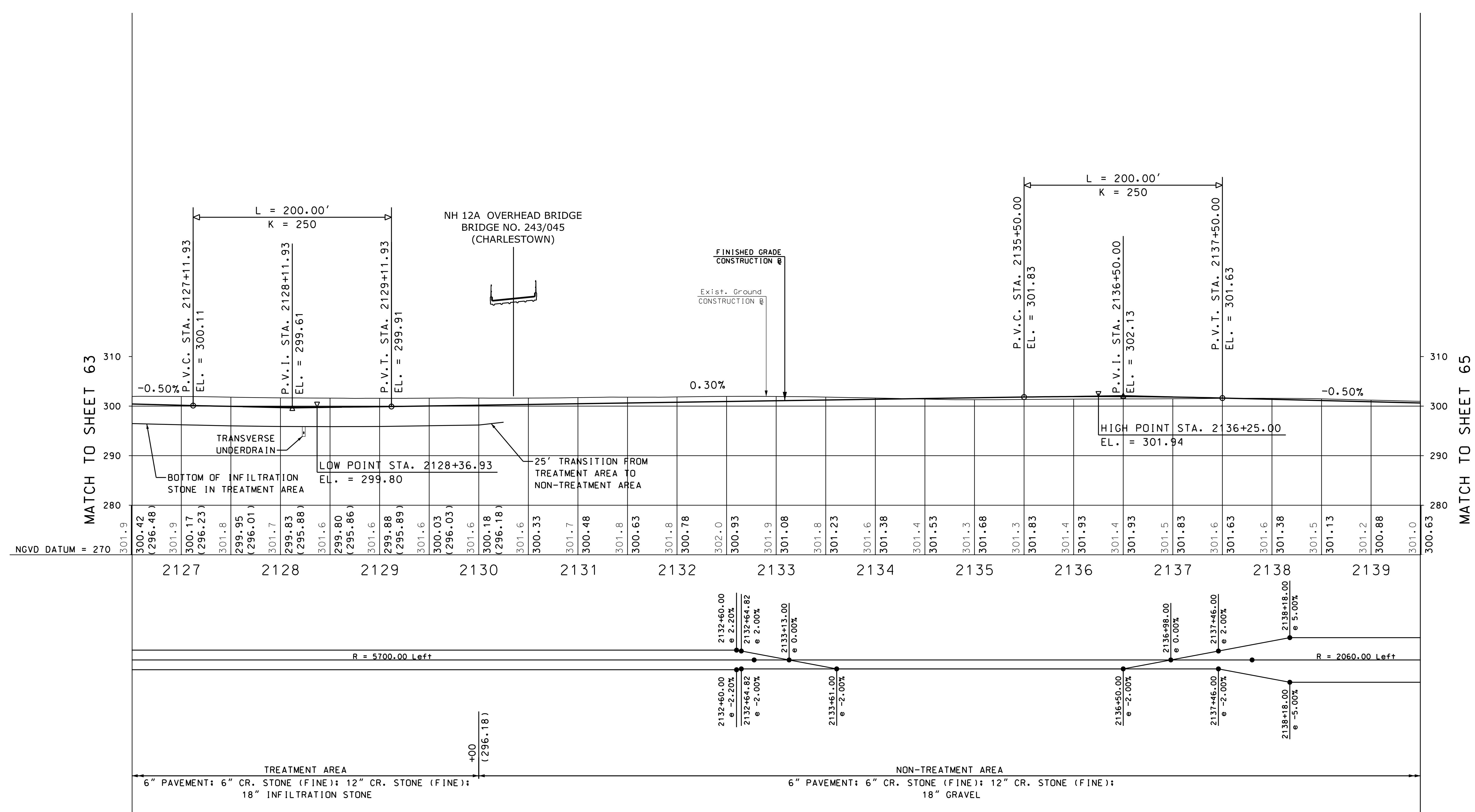
STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

PROFILE

N.H. ROUTE 12

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
PRO10	14747PRO_MC8M	14747	63	220



NOTE:

XXX.X = EXISTING GROUND

XXX.XX = PROPOSED TOP OF ROADWAY

(XXX.XX) = PROPOSED BOTTOM OF INFILTRATION STONE

PROFILE - N.H. ROUTE 12

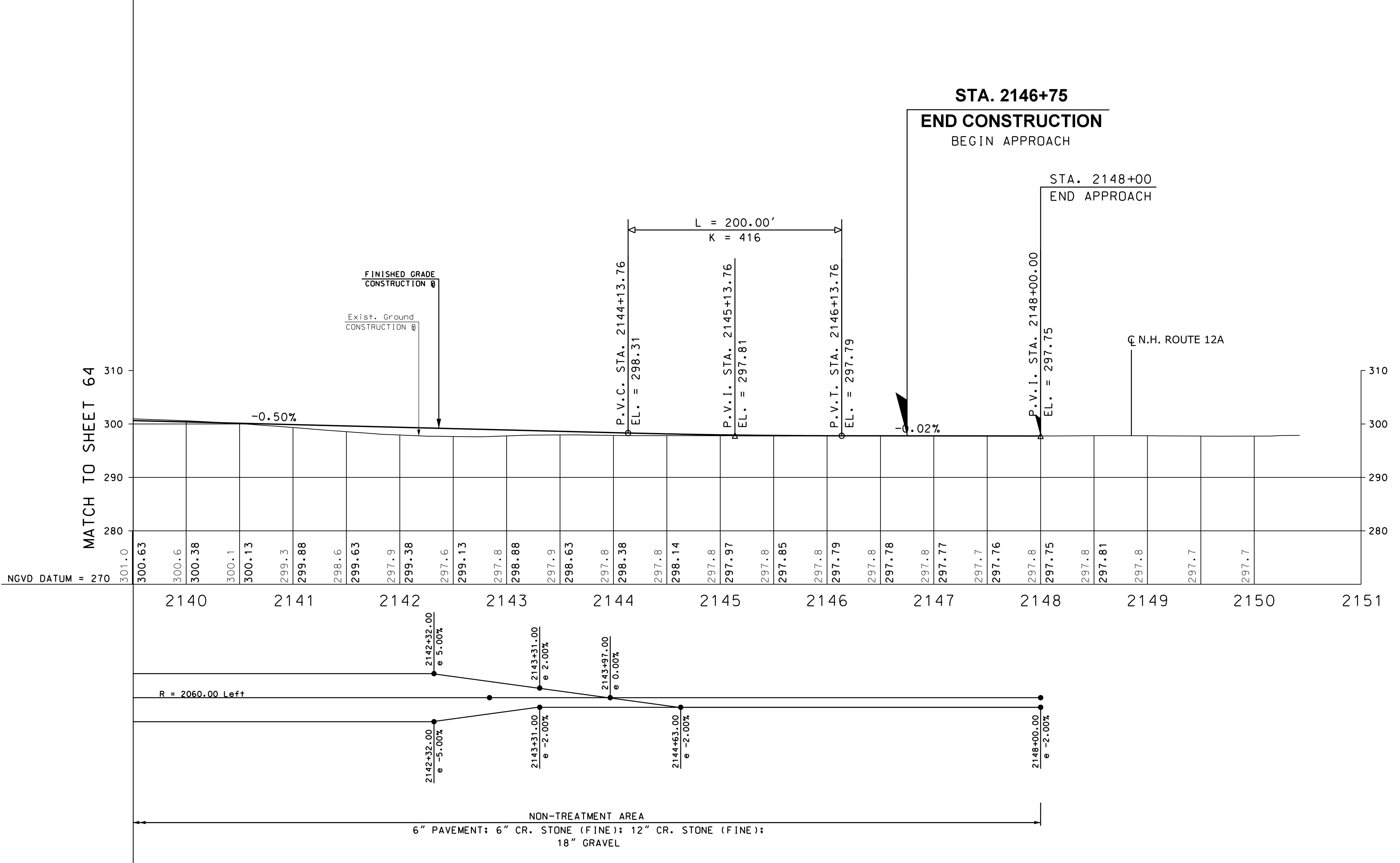
SCALE:
1" = 50' HORIZ.
1" = 10' VERT.

STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

PROFILE
N.H. ROUTE 12

MODEL	DGN	STATE PROJECT NO.	sheet no.	total sheets
PRO11	14747PRO_MC8M	14747	64	220



NOTE:

XXX.X = EXISTING GROUND

XXX.XX = PROPOSED TOP OF ROADWAY

(XXX.XX) = PROPOSED BOTTOM OF
INFILTRATION STONE

PROFILE = N.H. ROUTE 1

SCALE:
1 " = 50' HORIZ
1 " = 10' VERT

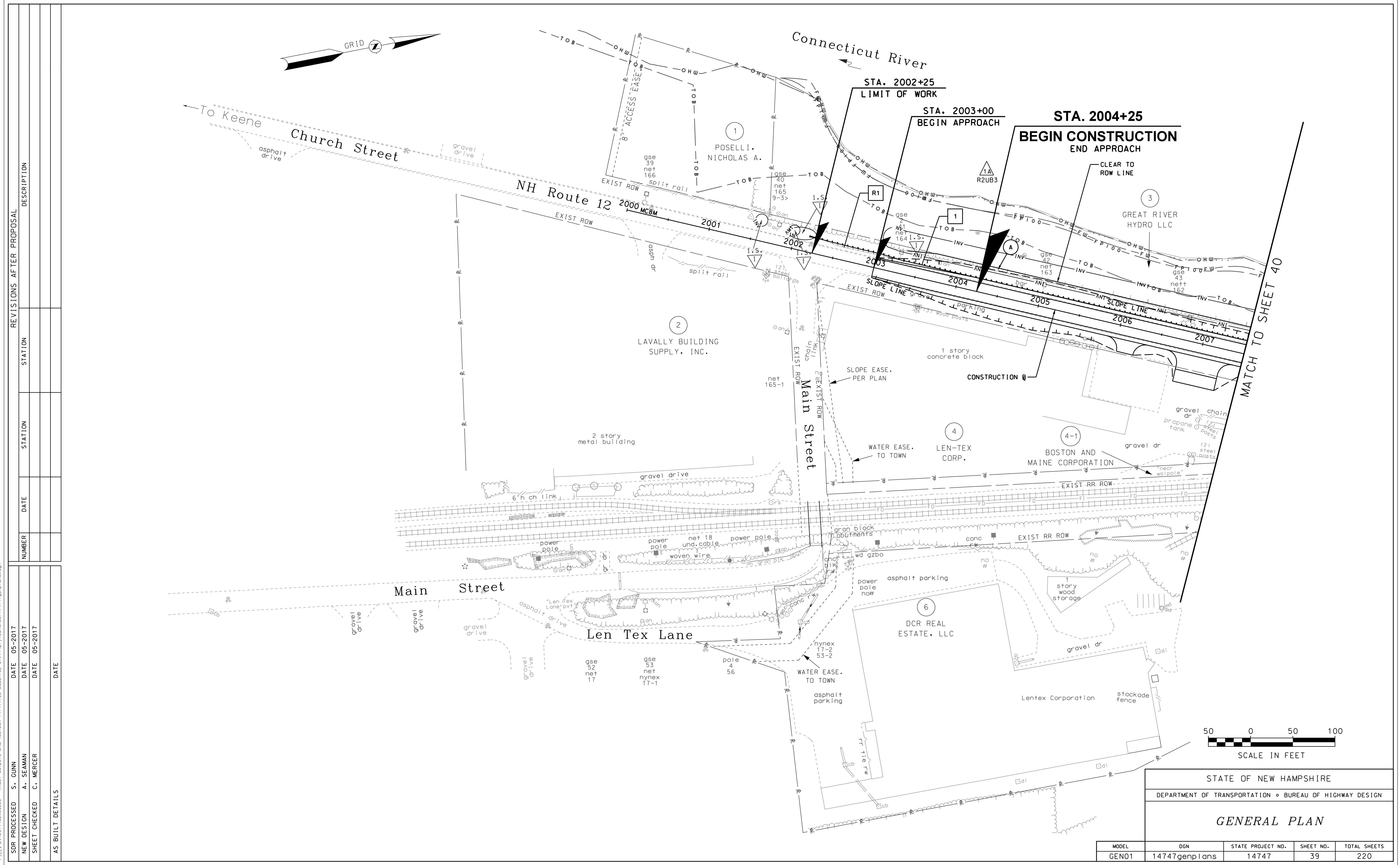
STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN
PROFILE
N.H. ROUTE 12

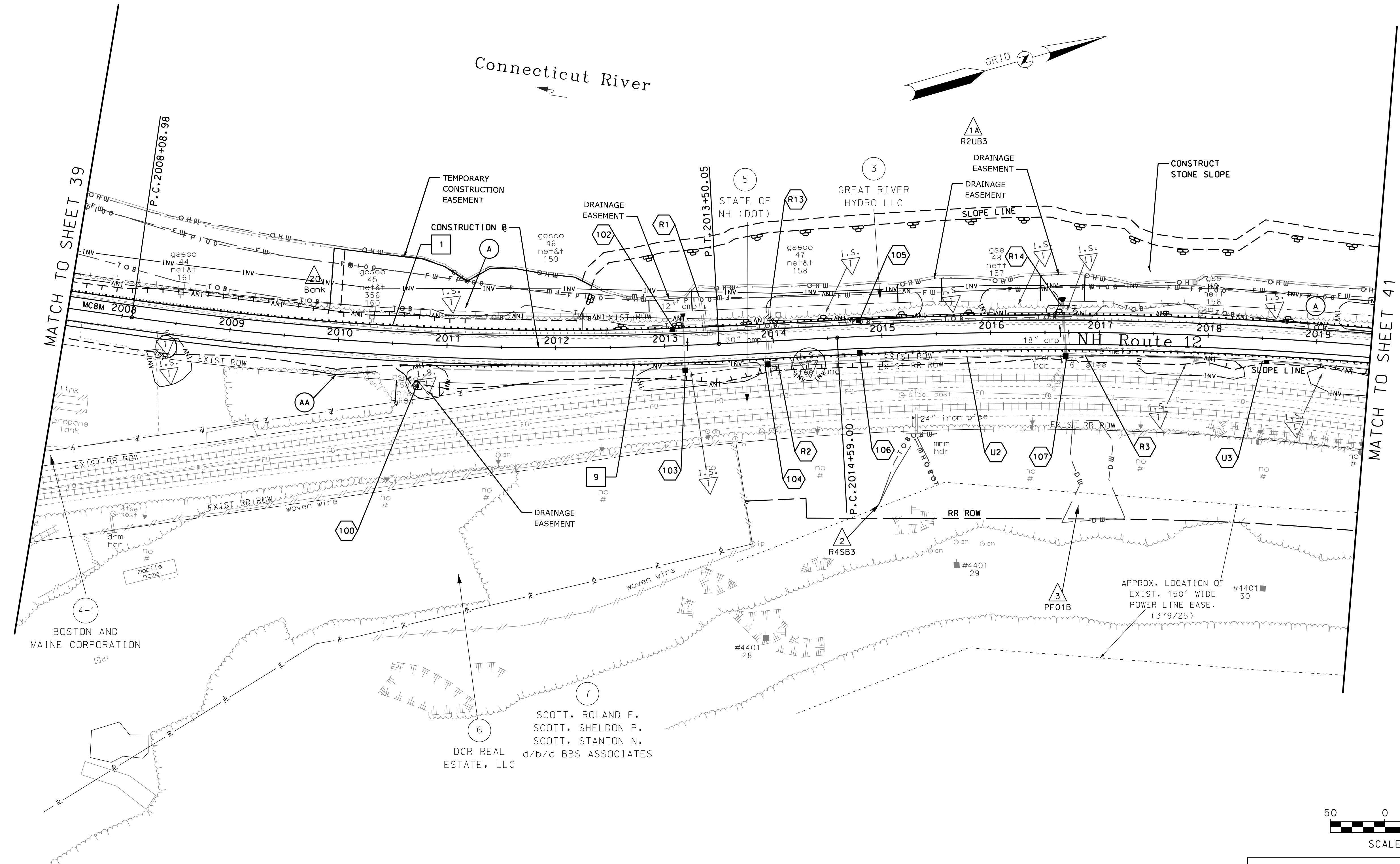
New Hampshire Department of Transportation
Walpole-Charlestown, X-A000(487),14747
N.H. Route 12 Reconstruction

POLLUTANT LOADING ANALYSIS REPORT

APPENDIX 10:

GENERAL PLANS (PSE DESIGN LEVEL)





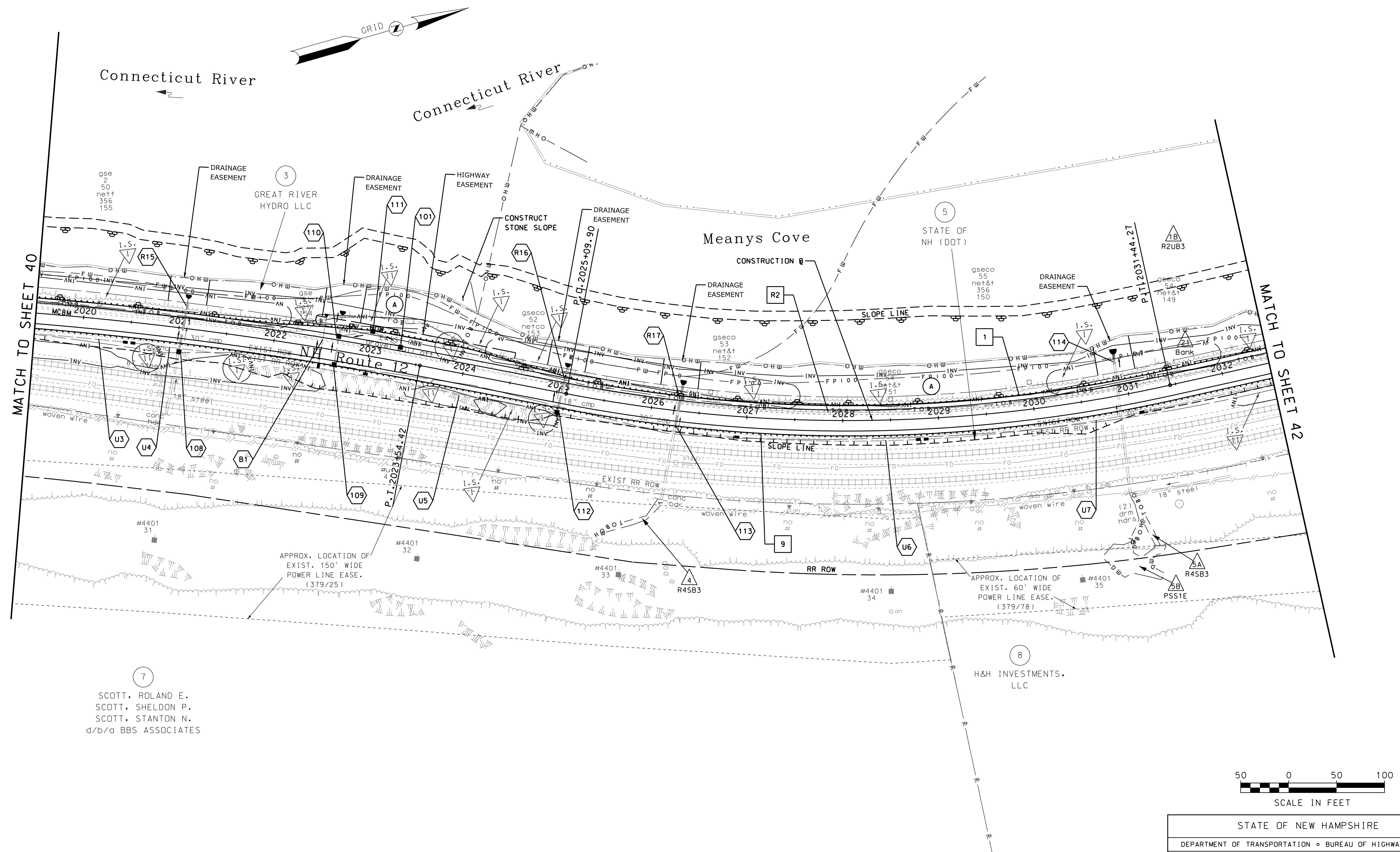
SCALE IN FEET

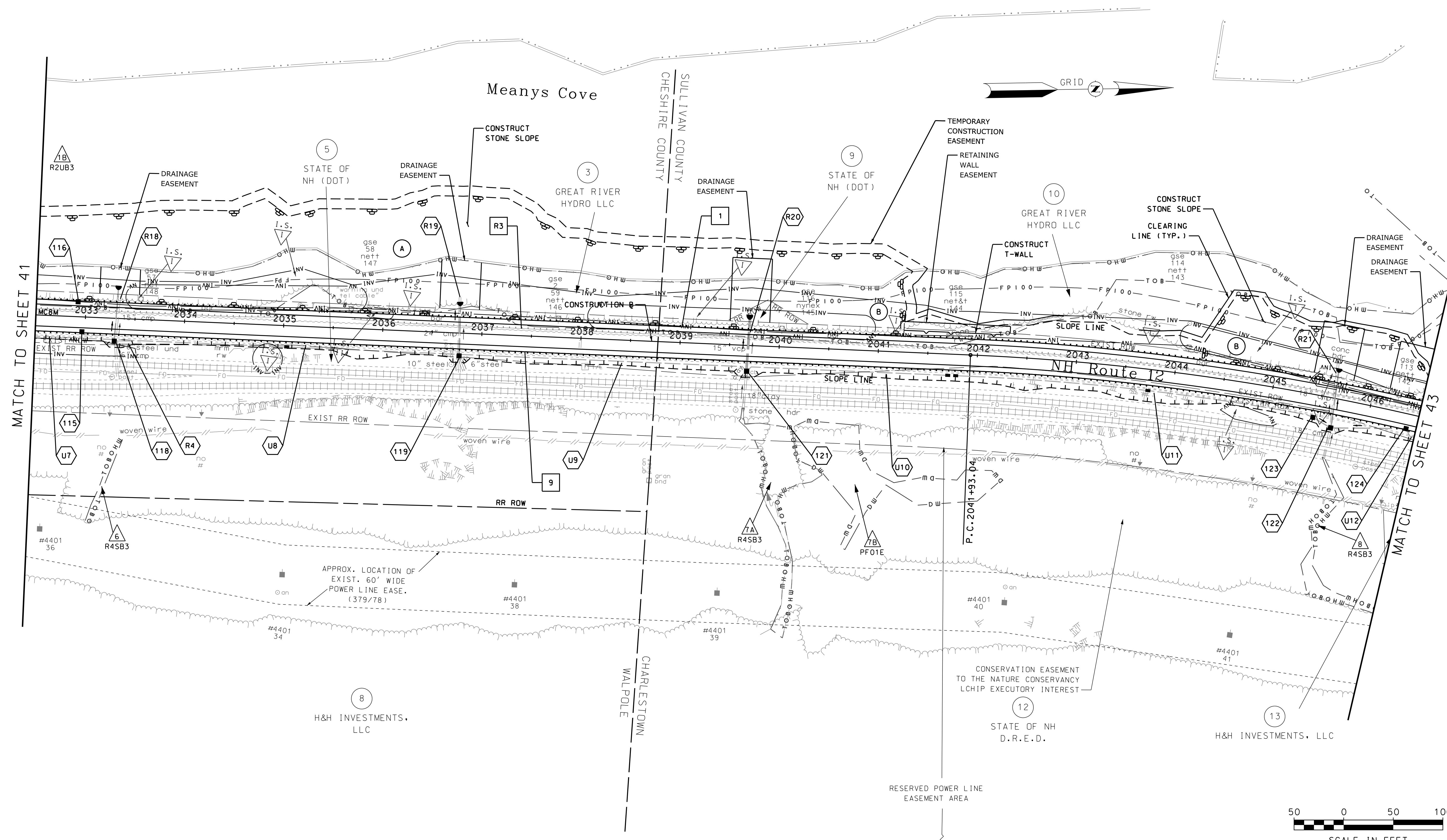
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

[View Details](#) | [Edit](#) | [Delete](#)

GENERAL PLAN

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
GEN02	14747genplans	14747	40	220





SCALE IN FEET

STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

GENERAL PLAN

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
GEN04	14747genplans	14747	42	220

Means Cov

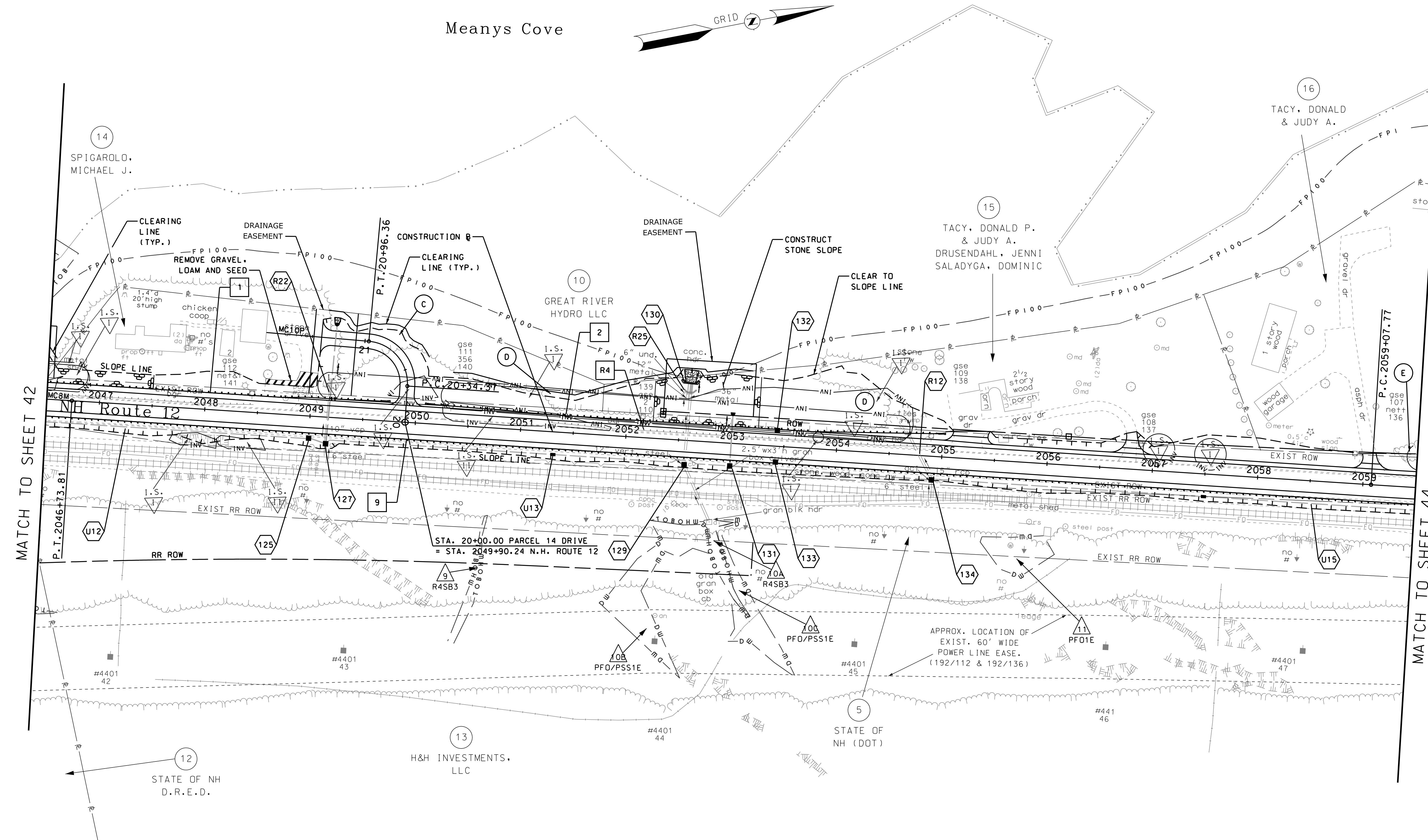
A diagram of a grid antenna. It consists of two parallel horizontal lines representing a grid. The word "GRID" is written vertically along the top line. A circular connector symbol with a 'Z' inside is attached to the right end of the top line.

MATCH TO SHEET 12

MATCH TO SHEET

FILE: p:\2011\ee2\x56800 - nhdot walpole-charlestown 14747*100 cadd*702-civil *prj*cuSheet*\14747genplans.dgn

AS BUILT DETAILS		
SDR PROCESSED	S.	GUNN
NEW DESIGN	A.	SEAMAN
SHEET CHECKED	C.	MERCER



A scale bar diagram for a map. It consists of a horizontal line with tick marks. The numbers 50, 0, 50, and 100 are placed at regular intervals along the line. Below the line, the text "SCALE IN FEET" is written in capital letters.

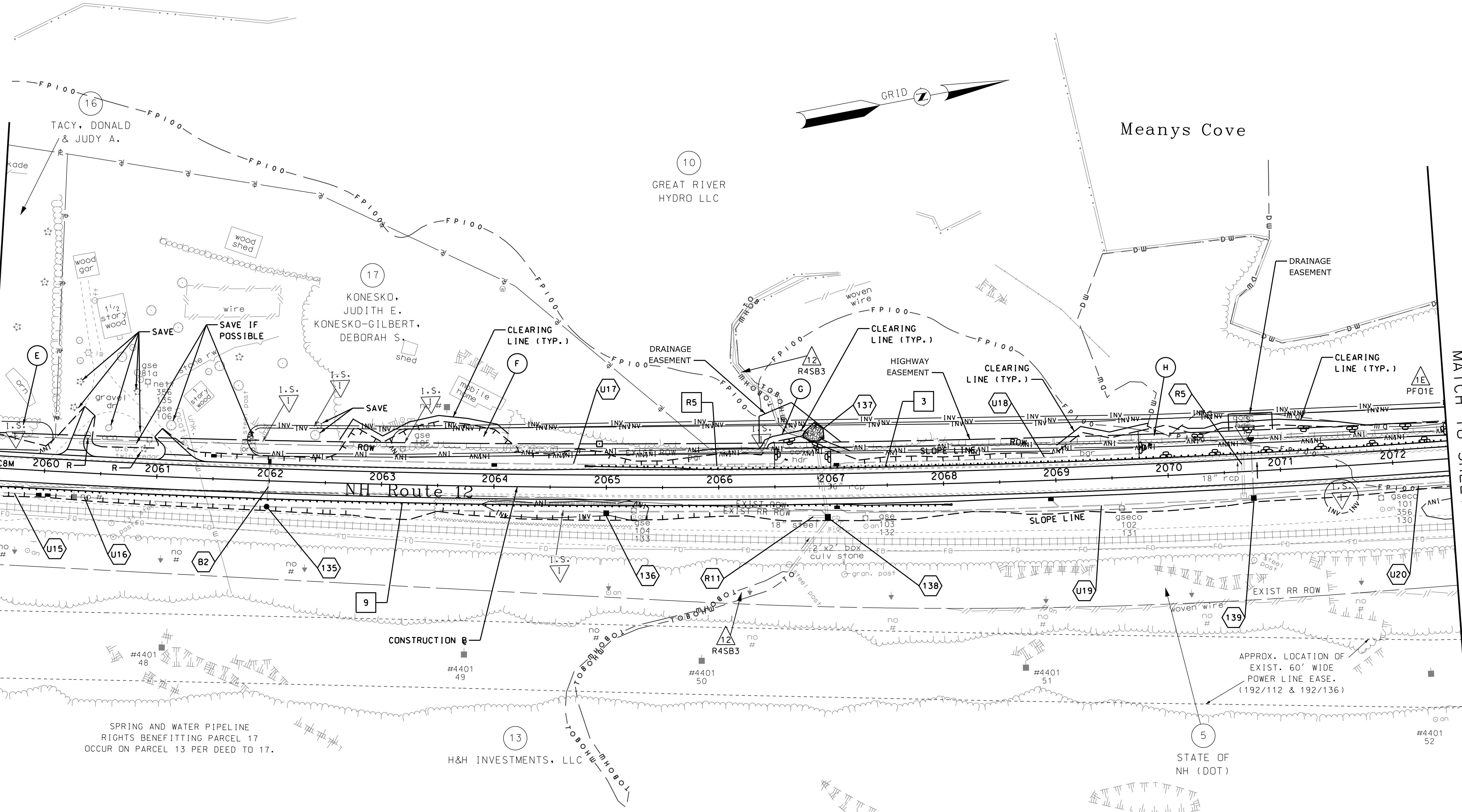
SCALE IN FEET

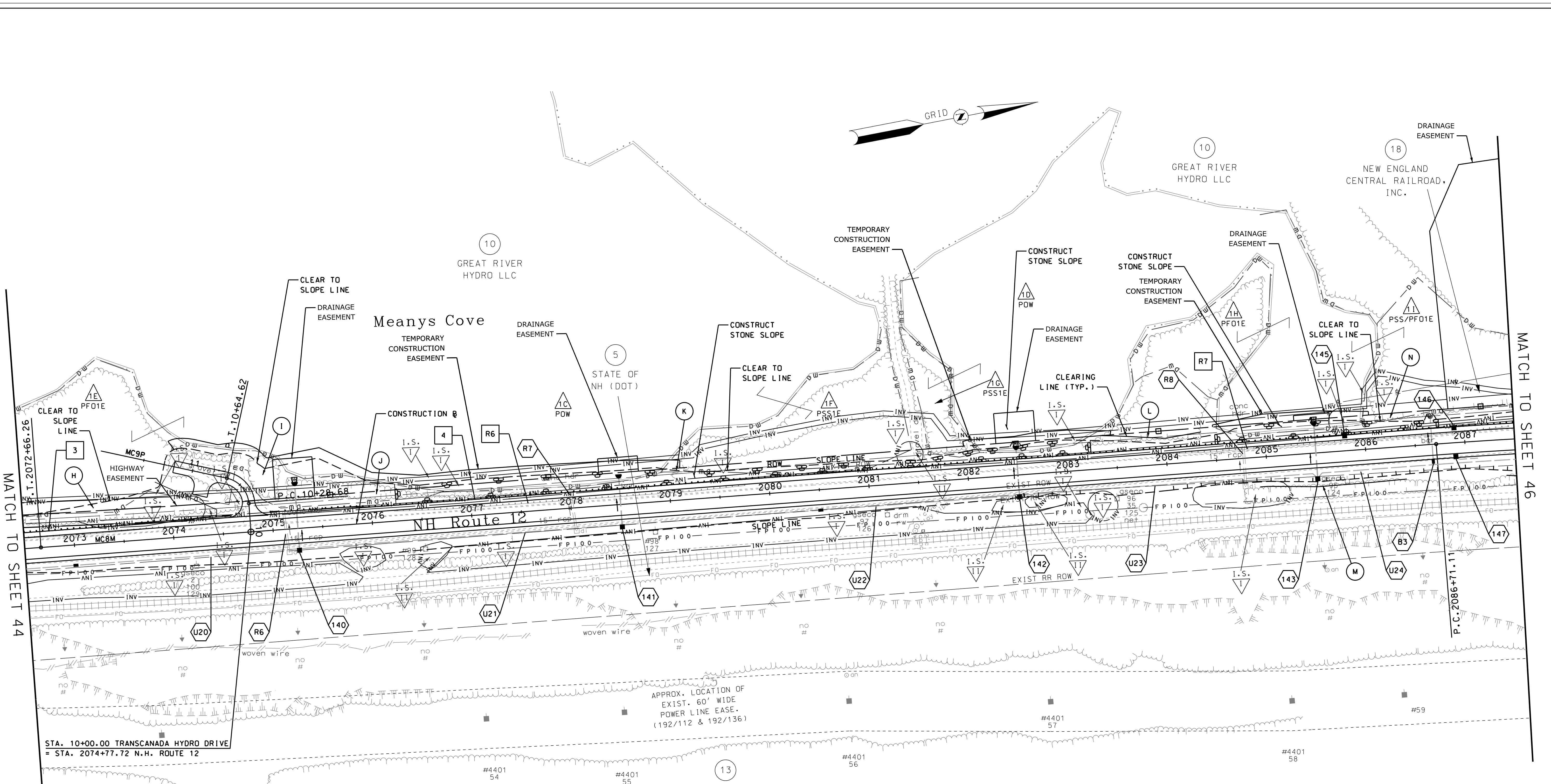
GENERAL PLAN

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
GEN05	14747genplans	14747	43	220

MATCH TO SHEET 43

MATCH TO SHEET 45





APPROX. LOCATION
EXIST. 60' W
POWER LINE EA
(192/112 & 192

H&H INVESTMENTS, L

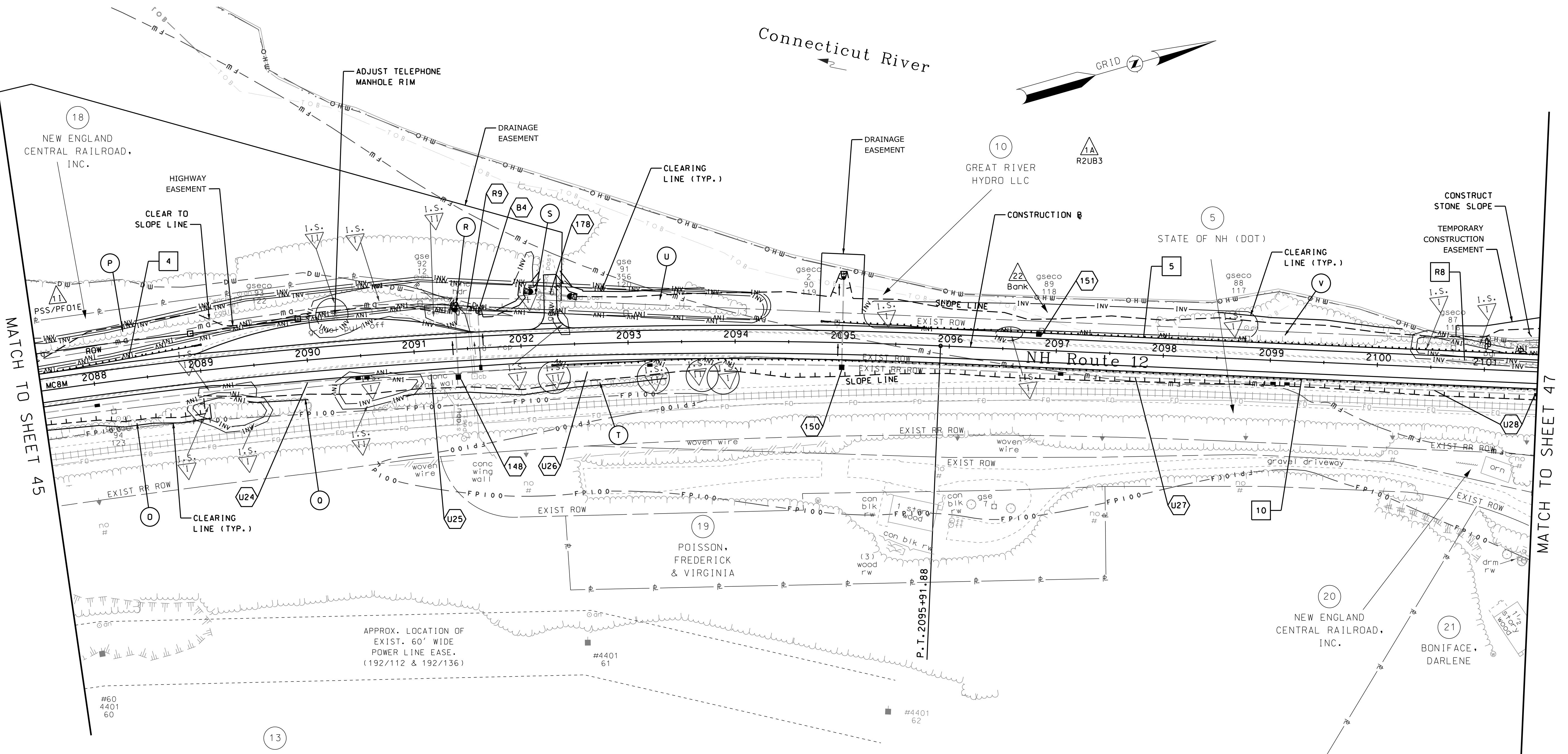
SCALE IN FEET

STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

GENERAL PLAN

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
GEN07	14747genplans	14747	45	220



MATCH TO SHEET 45

MATCH TO SHEET 47

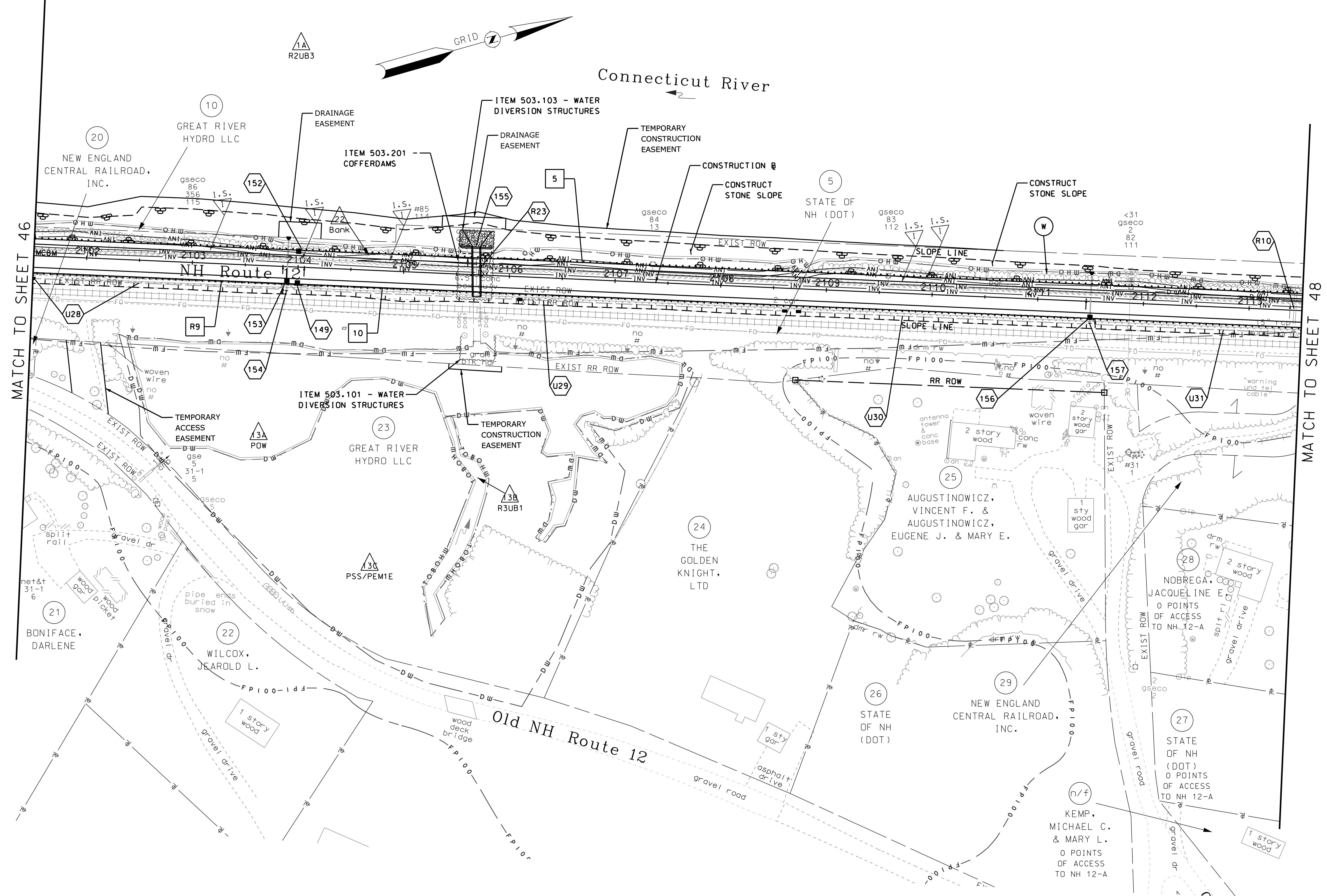
SCALE IN FEET
50 0 50 100

STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

GENERAL PLAN

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
GEN08	14747genplans	14747	46	220

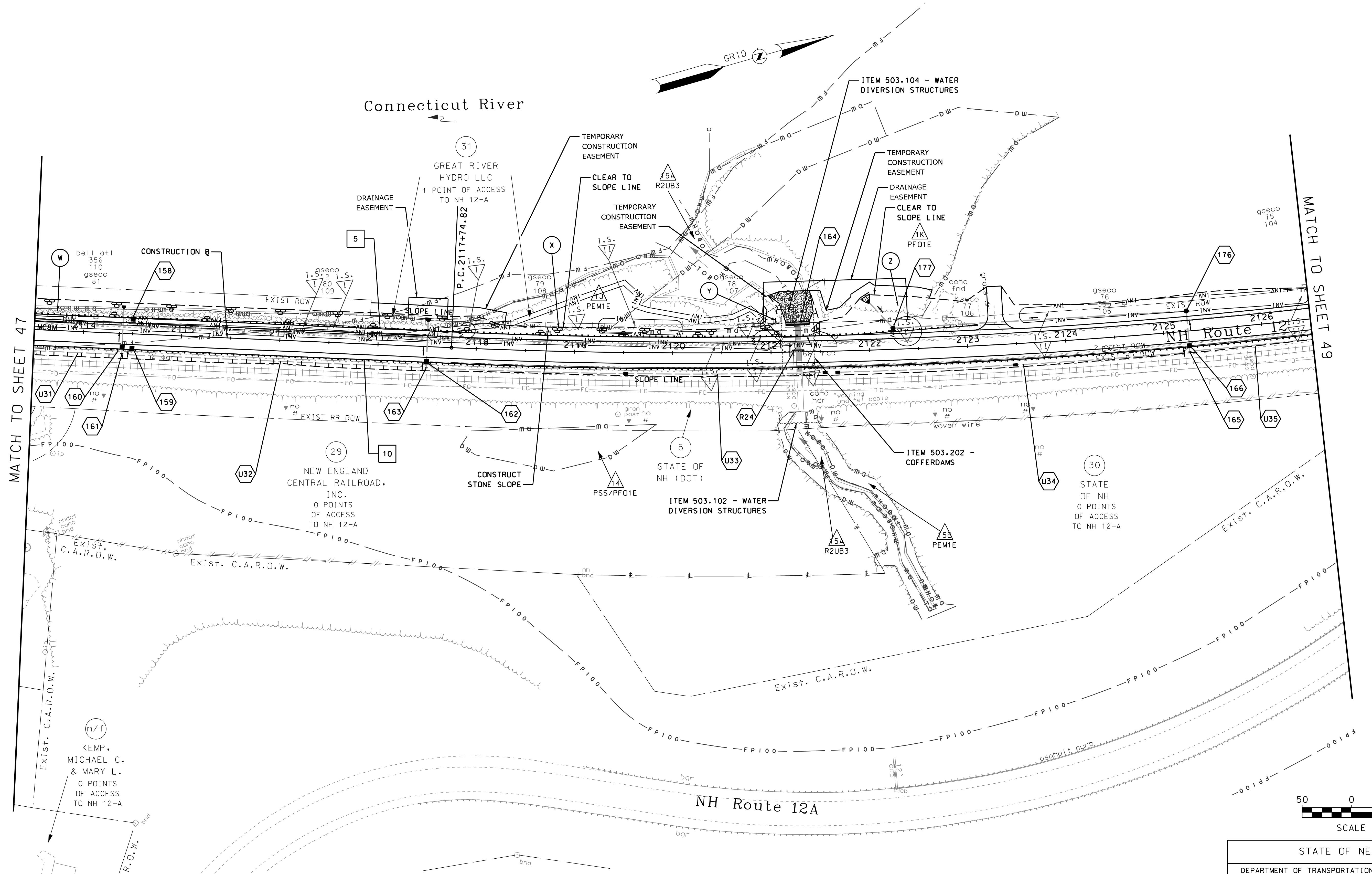


STATE OF NEW HAMPSHIRE

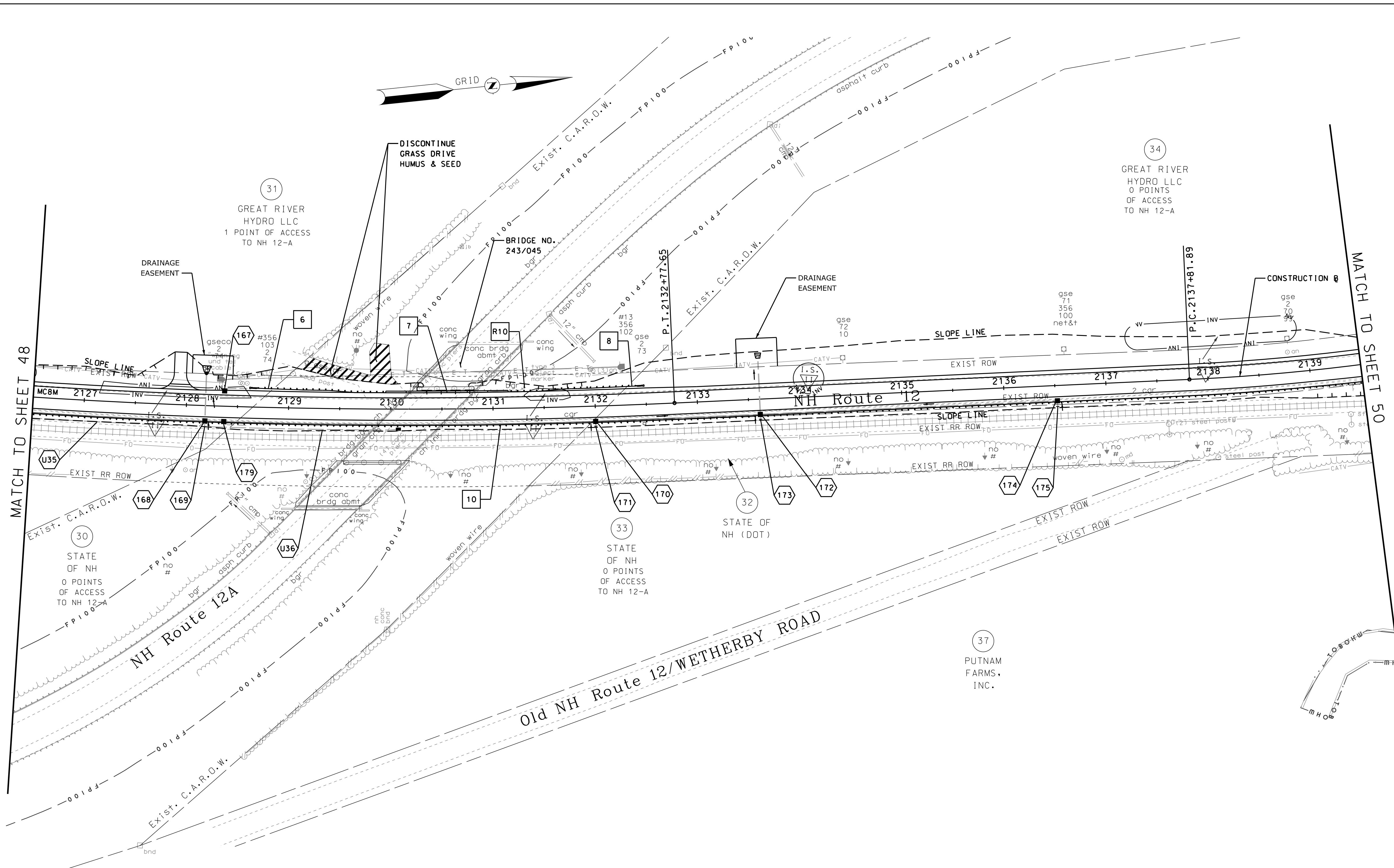
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

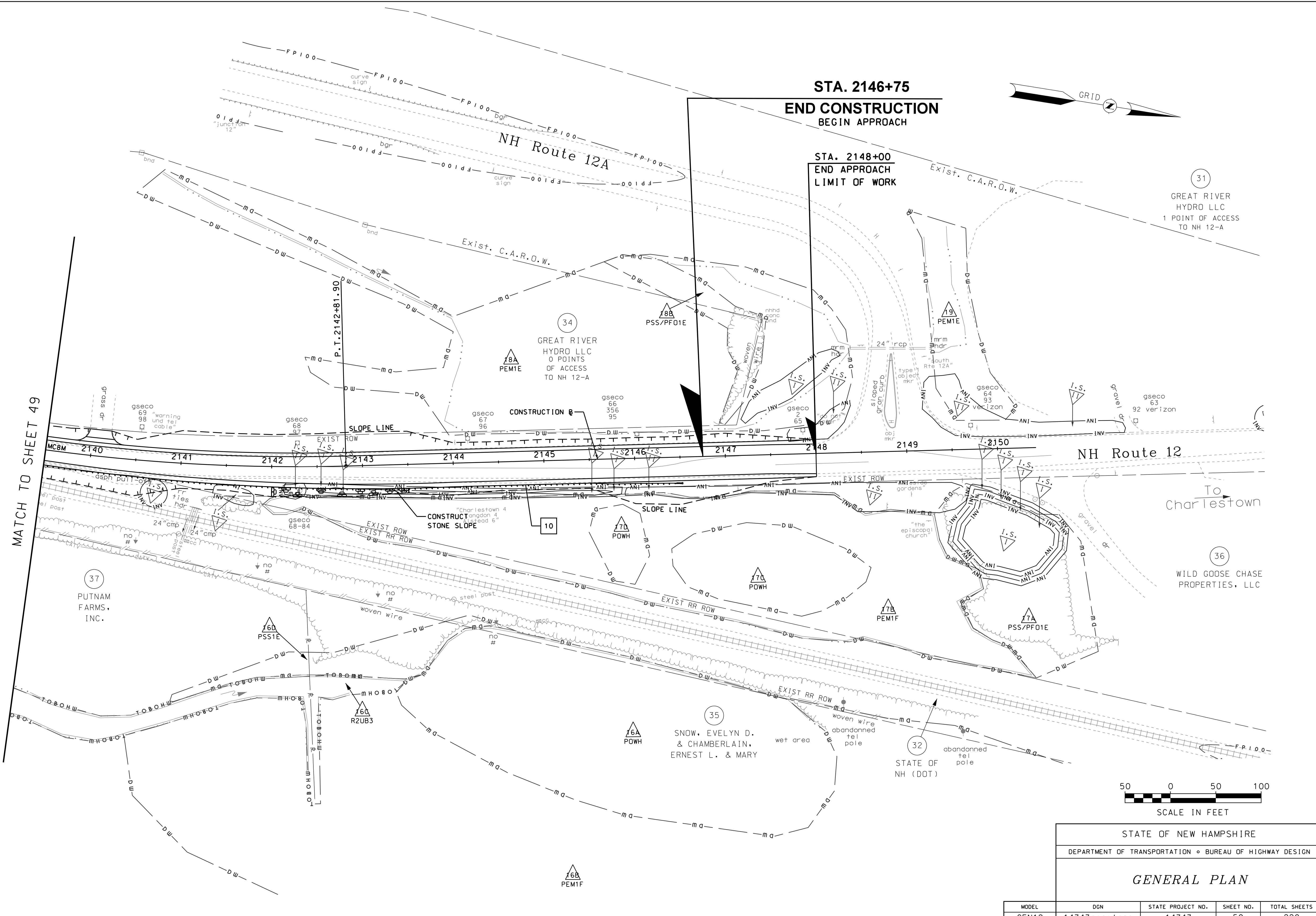
GENERAL PLAN

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
GEN09	14747genplans	14747	47	220



GENERAL PLAN





ER: NHDOT DATE: 6/16/2017 TIME: 7:23:57 AM